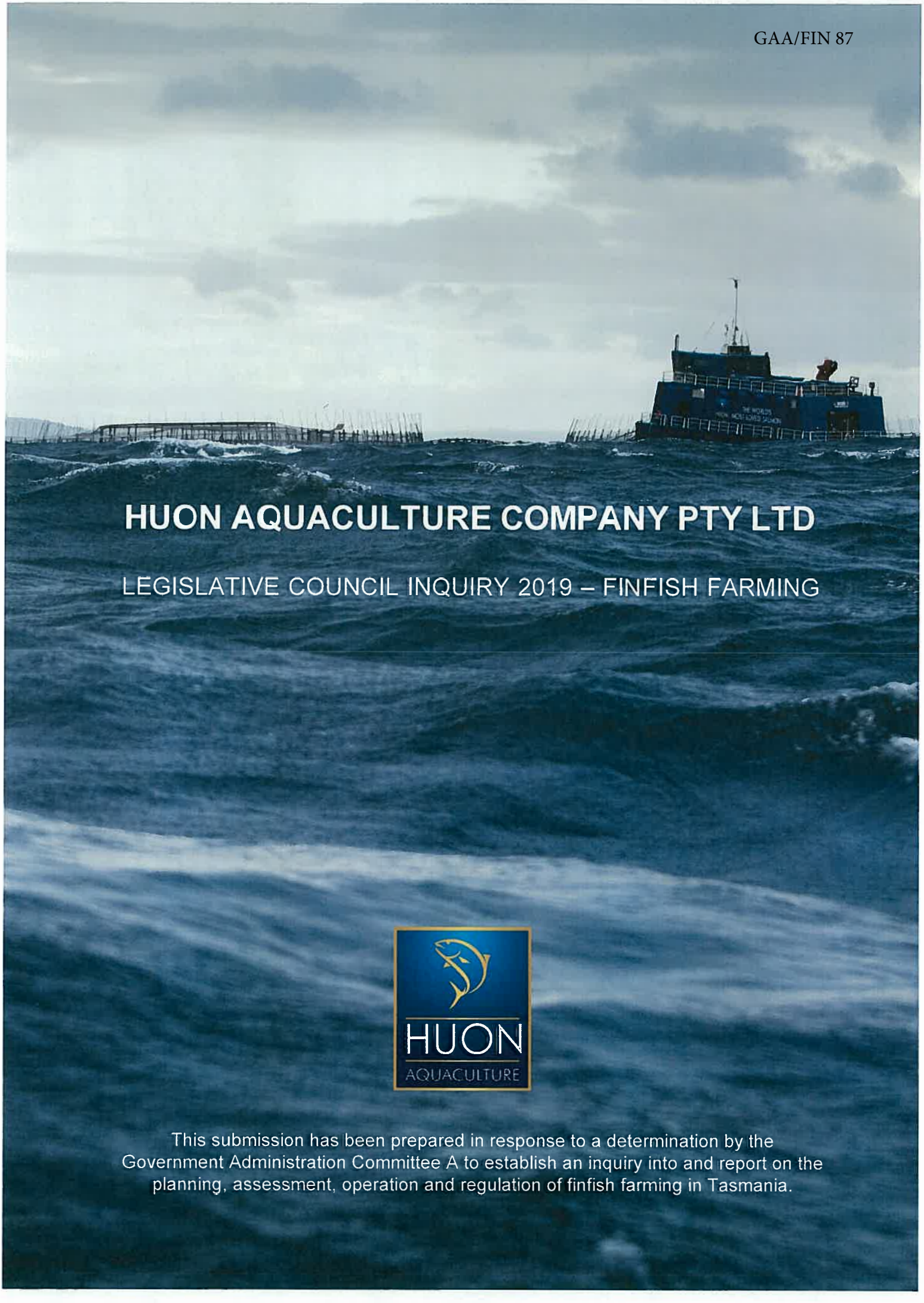


HUON AQUACULTURE COMPANY PTY LTD

LEGISLATIVE COUNCIL INQUIRY 2019 – FINFISH FARMING

HUON AQUACULTURE

This submission has been prepared in response to a determination by the Government Administration Committee A to establish an inquiry into and report on the planning, assessment, operation and regulation of finfish farming in Tasmania.

Mr Stuart Wright
Inquiry Secretary
Parliament House
HOBART 7000

Email: finfish@parliament.tas.gov.au

Dear Mr Wright,

RE: LEGISLATIVE COUNCIL SESSIONAL COMMITTEE GOVERNMENT ADMINISTRATION A - FIN FISH FARMING IN TASMANIA INQUIRY

As the Huon name suggests, our company is Tasmanian at heart.

One-hundred percent of our salmon and ocean trout is grown in Tasmania.

Just take a moment to consider that **just 35 years ago this $1 billion industry did not exist** in this country.

Huon is focussed on safe and sustainable production growth, further increasing tangible benefits to the Tasmanian community. Aquaculture is a leading Tasmanian primary industry, a generator of employment, technology, services and suppliers, creating a strong economic and jobs multiplier effect; integral for Tasmania's future and current industry prosperity.

We are continuously working to be world-leading in terms of environmental management, fish-health practices, biosecurity, and sustainability to ensure our stakeholders; our 720+ staff and their families, our suppliers, customers and our communities can continue to be proud of what we've achieved.

The salmonid farming industry is a considerable contributor to the Tasmanian economy and community, and warrants reasonable, appropriate policy, regulation and planning that is informed by the best science; which is exactly what is happening. The legislation, regulation and processes that underpin our industry are robust and most importantly, backed by science.

Likewise, it is critical that Tasmania does not repeat the experiences of other countries, where poor biosecurity practices and rapid industry growth combined to cause catastrophic industry collapse, primarily due to the uncontrolled spread of fish diseases. We are constantly taking action to anticipate change. The way we are farming now is completely different to the way we were farming five years ago as such, we are one of the first Atlantic Salmon companies in the world to go offshore–into rough waters.

The future landscape of aquaculture in Australia offers some very exciting opportunities. We have a growing world population and a decline in wild fish stocks, and an enormous amount of ocean. The only way we can actually sustainably feed this growing population is through aquaculture.

At the same time, we know we are stewards of the waterways we farm, so they can be enjoyed and farmed for generations to come.

Both of us remain involved in the company on a daily basis and our passion for this industry and its capacity to grow a quality product, provide valued regional employment opportunities, farm sustainably, and continue to innovate in global terms will never wane.

Huon Aquaculture once again extends an opportunity to the Committee to undertake both a farm and hatchery visit as it is only once that has occurred that anyone can begin to understand the care, complexities, innovation, science and outstanding achievements that our company and staff undertake 365 days a year.

We note the Chair has publicly indicated that the Committee will be directly contacting the companies regarding this inquiry and representatives from Huon Aquaculture welcome the opportunity to speak directly with the Committee.

In the interim, this submission and accompanying video provides an insight into Huon Aquaculture and the clever people behind the brand.

Peter and Frances Bender

Co-Founders

29th November, 2019

Executive Summary

Where relevant, Huon's submission addresses the stated ToR, but also sets out in greater detail the following statements:

- The Tasmanian salmon industry is one of the most heavily regulated industries in the State:
    - The industry intersects with hundreds of pieces of local, State and Federal legislation; a reality that Huon has always expressed its strong support and commitment to,
    - Legislation, regulation and processes that underpin our industry are robust and most importantly, backed by science, as evidenced by the approvals process for our new lease, East of Yellow Bluff. The process behind the creation of this new farming zone and associated lease involved the preparation of an Environmental Impact Statement, completion of a Section 40 response, and assessment under the Federal *Environment Protection and Biodiversity Conservation* Act *1999 (*EPBC Act*)* which ensures that if any threatened or vulnerable species are present or migratory to the proposed area, that adequate measures are in place to protect them and their habitat.

- We are also one of the most transparent industries. Huon heeded the messages from the 2016 Senate Inquiry about the need to provide more information about our farming operations:
    - resulting in the creation of our online Sustainability Dashboard (when released it was the first of its kind across the worldwide agribusiness industry),
    - the level of detail contained on our website where we publish environmental monitoring reports–the exact same reports we provide to the State Environmental Protection Authority (EPA),
    - the hosting of numerous open-door community information sessions and consultations, plus open days in Hobart and at Port Huon attended by thousands of Tasmanians.

  Finally, our lower risk tolerance and prudent management of all our farming sites is on the public record, as evidenced by numerous media interviews, community consultations and legal proceedings (in relation to Macquarie Harbour).

- Just because we are a for-profit company, doesn't mean we forfeit our values which would be shared by most Tasmanians, as evidenced by our founders being named Farmers of the Year in 2018. We are focused on:
    - a) protecting the environment that we all value and enjoy, as evidenced by our regular ROV monitoring surveys, our $400m investment in capital and infrastructure improvements in past five years which include our patented Fortress Pens and world-leading feed system; our precautionary approach to expansion and our sustainable farming practices including fallowing seabeds and moving offshore;
    - b) keeping our workers safe, as evidenced by our investment in feed barges, $100m patented Fortress Pen infrastructure which won a Tasmanian Worksafe Award in 2013, and our nationally awarded remotely controlled feed system;
    - c) protecting the welfare of our fish, as evidenced by our inclusion in 2018 as the only Australian seafood producer in the RSPCA Approved Farming Scheme; our commitment to vaccine development and our unwavering commitment to best-practice biosecurity principles; and
    - d) actively participating in our communities, as evidenced by our continuing capital investment and subsequent employment in regional areas (example, our $44m Whale Point Nursery), our engagement with the education sector to encourage rural-based youth to take up a career in aquaculture, our Helping Hand grants and ongoing support for grass-roots community events (everything from shoreline clean-ups to cleaning toilets at the Huonville emergency centre during the Summer 2019 bushfires).

A to Z of Huon Aquaculture

A for Algae/Algal Blooms

Salmon farming is often wrongly accused as being a contributor to the presence of Phytoplankton (Algae).

For a number of reasons, it is in our best interest to limit excessive algae growth as it can affect fish in a number of ways including reducing dissolved oxygen (DO) in the water, mechanical irritation of the gills and also the production of toxins. This is why algae species and numbers are monitored closely on all Huon's farming sites.

Algae are a natural and very important component of the earth's ecosystem—they produce about 50 per cent of the Earth's oxygen, and are a huge food source for aquatic animals up the food chain. Phytoplankton are microscopic plant organisms that live in well-lit surface layers of oceans, seas, lakes and other water bodies.

Algal blooms are a phenomenon caused by increases in water temperature and nutrient availability, either through anthropogenic inputs or natural environmental fluctuation. However, it is not always necessarily a local event as blooms are regularly transported by ocean currents and wind.

Outbreaks of algae killed up to a million fish in the Murray Darling Basin earlier this year without a salmon farm in site. https://salmonbusiness.com/institute-of-marine-research-fish-farming-cannot-possibly-be-the-cause-of-this-algae-bloom/

When humans channel agricultural run-off, sewerage and stormwater discharge into waterways, the amount of nutrients such as nitrogen and phosphorus dramatically increases. This creates an imbalance, and because some microscopic algae are supremely effective at mopping up nutrients and can grow very quickly, dividing up to once a day and quickly overtaking other species, the result can be an algal bloom.

Salmon farming is consistently accused of causing the outbreaks of the toxic algae *Gymnodinium Catenatum.*

This particular alga was first brought to Tasmanian waters in the ballast of international trading ships some of which regularly visited Port Huon in the days of both apple and paper pellets exports from the now closed APM mill. This alga causes toxic shellfish poisoning in humans and the blooms are associated with freshwater run off scenarios.

The introduction of marine invasive species is a still a major threat to all Tasmanian waters and was of great concern to our industry when recently an oil rig was towed for repairs into the Derwent River. While stringent international marine protocols exist regarding ballast water exchange it is important the Committee realises there is a risk, not just for the salmon industry but also for commercial and recreational fishers and endangered native marine species.

Huon monitors the number and species of algae in the water on a routine basis through the use of high quality on-site microscopes and internet capability for liaising between Huon and external experts for rapid identification and guidance. This is enhanced through having cameras in every pen that relay video back to Huon's central control room at in Hobart. Huon also regularly submits water samples from lease sites to Analytical Services Tasmania (AST) - over 2,000 water samples to AST since January 2001.

The results of all our regular algae monitoring are utilised by government authorities to inform of possible threats and outbreaks which then enables public health messaging to be immediately communicated despite our industry not being the cause, nor contributing to the outbreak.

Another example of Huon collaborating for the benefit of the entire community.

Refer to Appendix 1 for additional information on the algae testing and monitoring processes at Huon.

A for Antibiotics

We believe that disease control in salmon requires a holistic approach. Good site management, fish husbandry and rigorous biosecurity measures are central to reducing the risk of disease outbreaks and controlling the spread of infectious diseases. Vaccines are important in preventing disease outbreaks but cannot control all losses. Medication such as antibiotics is used as a last resort to avoid significant animal welfare issues and stock losses.

We have the attitude that antibiotics should only be used as a last line of defence. This mindset means that we are continually working to develop proactive diet regimes and vaccines to allow our salmon to combat known illnesses and lead healthy lives.

However, if our vet feels there is a need to treat fish with antibiotics it is supervised, reported and strictly regulated by government. The antibiotics are allowed to pass through the fish long before it is harvested in accordance with regulatory requirements. Huon has not used antibiotics at sea since 2016 when a single pen was treated (see Huon's website for publication of antibiotic use including quantities and pens treated) https://www.huonaqua.com.au/6657-2/.

Any antibiotic use is reported to State Government in real time.

Refer to Appendix 6 Fish Health and Welfare for additional information.

B for BEMP (Broadscale Environmental Monitoring Program)

The Tasmanian salmon industry leads the world in terms of best-practice monitoring for potential broadscale effects.

The Broadscale Environmental Monitoring Program (BEMP) was initiated in 2009 to provide knowledge and information on ecosystem function in the D'Entrecasteaux Channel and Huon Estuary. The objective of the program remains to document broadscale spatial and temporal trends for key

environmental parameters, allowing assessment of the environmental effects of finfish aquaculture in the region.

Huon's farming leases are included in this world-leading monitoring program.

The BEMP program has long been the only fish farm monitoring program in the world assessing effects outside AZE's (Allowable Zone of Effect) or close to/inside the farms.

The BEMP program includes assessment of water column and sediment health at a broadscale level across the study area and was largely structured around recommendations of CSIRO and IMAS (UTAS as it was then) taking into account previous studies undertaken in the region.

Sediment sampling includes benthic infauna, stable isotopes, particle size, visual assessment, redox analysis and sulphide measurements. Visual assessment, redox and sulphide analysis is carried out each year, while analysis of benthic infauna, stable isotopes and particle size is undertaken every four (4) years. In the intervening years these samples are collected, preserved and retained.

Water quality analytes include physico-chemical parameters (temperature, dissolved oxygen, salinity), nutrients (dissolved nutrients: ammonia, nitrate, phosphate, silicate, total nutrients: total nitrogen, total phosphorous), chlorophyll A and phytoplankton species counts. Water quality sampling is undertaken monthly from May to January and fortnightly from February to April.

A total of 15 sites are included in the monitoring program; including nine (9) sites in the D'Entrecasteaux Channel MFDP, five (5) sites in the Huon River/Port Esperance MFDP's and a control site at Recherche Bay.

The following statements were extracted from Broadscale Environmental Monitoring Program. D'Entrecasteaux Channel and Huon Marine Farming Development Plan Sites Combined Annual Report (Version 1.1) 2012/13-2016/17 - November 2017.

https://epa.tas.gov.au/regulation/salmon-aquaculture/dentrecasteaux-channel-huon-and-port-esperance/bemp-monitoring

- *Based on the benthic infauna and sediment chemistry parameters considered (visual assessment, redox, sulphide, particle size, stable isotopes) for the reporting period 2012/13-2016/2017, there has been no consistent trends considered strong evidence of organic enrichment at the broad scale monitoring sites sampled under the BEMP program.*
- *For most nutrients (i.e. nitrate, phosphate, silicate, total nitrogen, total phosphorous), concentrations measured in the 2012/13-2016/17 reporting period were within the range recorded in previous sampling years and there was no evidence of broad scale changes in water quality characteristics.*
- *There was no evidence of increasing chlorophyll a concentrations over the reporting period, nor was there evidence that the frequency and/or magnitude of bloom events has changed. There was also no evidence of increasing abundance of harmful phytoplankton species during the reporting period.*

See Appendix 2 for more details on the BEMP monitoring.

B for Biosecurity

At Huon Aquaculture, we take biosecurity very seriously, and both our company and public actions over many years demonstrate the company's commitment to protect the environment in which we farm. Biosecurity is not only a matter of good hygiene and disinfection procedures but also requires that fish have optimal nutrition, live in high quality water and avoid stress.

All these factors have contributed to our salmon being less susceptible to disease and infection; evidenced by our zero use of antibiotics in a marine environment since 2016, being named the 2013 Australian Biosecurity (animal) Farmer of the Year; the first aquaculture company to receive this prestigious award and the first salmon farmer to be awarded Australian Farmer of the Year in 2018.

Biosecurity in its broadest definition is the prevention of disease-causing organisms entering or leaving any site where they pose a risk to farmed stock, other animals, 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 and never totally eliminated from aquatic systems.

Specific pathways by which exotic or new diseases not currently occurring in Tasmanian farmed salmonids could be introduced, or by which existing diseases could be spread between sites include:

- Live fish movements, including the water in which they are transported. Live fish includes: eggs, fry, smolt and brood stock.
- Infected fish products including: harvest fish, fish products, waste products and mortalities.
- 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, crustaceans, zooplankton, algae). These species may also be carrying potential pathogens not yet introduced into farmed stock.
- Recreational anglers and wild fishers including: contaminated tackle, vehicles, bait.
- Intake water (this includes town, river and bore water sources at hatcheries).
- Wildlife (e.g. birds, rodents).

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

Early diagnosis and notification is essential for effective management of new or emerging risks.

The Tasmanian *Animal Health Act 1995* requires the salmon industry by law to report any case or suspicion of a notifiable animal disease. These notifiable diseases are all serious.

Huon has a comprehensive Veterinary Health and Biosecurity Plan (VHBP). The HVBP is based on a detailed Risk Assessment Review across Huon operations, consolidated with the collective experience and standard operating procedures of Huon staff over 30 years and an extensive review of biosecurity practices in overseas salmon producing countries. The VHBP describes the principles and procedures used by Huon to maintain the health and wellbeing of fish throughout all stages of the lifecycle from hatchery to harvest. As such, the VHBP encompasses all marine farm, hatchery and processing sites operated by Huon.

The VHBP aims to identify and define areas of management and husbandry where agreed protocols and procedures are targeted to "best practice" to optimise salmonid health and welfare. The VHBP outlines the objectives and aspirations which are regularly reviewed and updated to promote continuous improvement.

Disease 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.

Tasmania operates strict biosecurity measures to which the salmon industry complies (refer Tasmanian Biosecurity Strategy 2013-2017 https://dpipwe.tas.gov.au/biosecurity-tasmania/biosecurity-policy-strategy-publications/tasmanian-biosecurity-strategy-2013-2017).

The Tasmanian salmon industry prepared a statewide biosecurity plan back in 2013. However, following the Blue Future Salmon Conference, salmonid industry veterinarians prepared a more comprehensive updated plan based on the current state of knowledge, learnings from the conference and relevant to the dynamic and evolving industry operations and practices.

The Draft Plan has been reviewed by a third party expert–Professor Larry Hamell (University of Prince Edward Island, Canada). A final version of the Plan has been agreed in consultation with the relevant Tasmanian authorities i.e. Biosecurity Tasmania, Marine Farming Branch (DPIPWE), Inland Fisheries and the EPA.

Industry and government is currently working together to formalise the implementation of the measures in the Plan and review how the Plan can best be managed within the new Biosecurity Act framework.

See Appendix 3 for more details on Huon's Veterinary Health and Biosecurity Plan and other biosecurity practices.

B for By-product

At Huon, we have a whole-of-fish philosophy, which is why we have a dedicated role responsible for finding purposes for our by-products. By-product innovation has many benefits to Huon, most notably reducing our wastage and increasing our sustainability.

By-products at Huon are essentially the leftover materials from first-grade products, as well as non-organic materials that are no longer usable. These include (but are not limited to) salmon skins, salmon heads and frames, off cuts and hatchery water and sludge (left over post-water filtration), old ropes and pipes. While recognising by-products is one thing, finding a use for them is where the innovation comes in.

While by-product innovation is done in-house wherever possible, it also involves discussions and agreements with third-party manufacturers. An example of this collaboration is a manufacturer who has a contract to turn our unwanted salmon skins into salmon skin leather, which is then used to make products such as purses, small bags and belts. Previously our salmon skins were used as compost, and before that landfill. The evolution of this by-product innovation is just one example of how far Huon has come to reduce our environmental footprint and minimise unnecessary waste. Another example of third-party collaborations is a pet-food supply chain who are taking our salmon smolt, heads and frames and turning them into nutritious, high-end pet food.

Our Forest Home hatchery by-product, irrigation water, is an excellent example of not just re-use of by-products but also collaboration among farmers. The farmland on which the hatchery is located recently received organic certification from the National Association for Sustainable Agriculture Australia. Huon leases the land to Bruny Island Cheese (BIC) for harvesting grass as silage and hay as well as grazing calves and dry cows. Now that this land has also been certified organic, BIC can label all outputs (i.e. cheese, milk) as organic.

The organic certification of Forest Huon is due to fact that 95 per cent of hatchery waste water is recirculated. As part of the recirculation process, all waste from the fish is collected and separated into

solid and liquid fractions. The solids are transported offsite for use in compost and fertiliser on nearby farm land. Wastewater is filtered to remove fine solids and is then passed through ozone treatment for disinfection. Once disinfected, it passes into two settlement and storage dams and is irrigated onto the BIC leased farm land in the drier summer months.

C for Climate Change

Like all farmers, we have taken steps to manage the impact that climate change has on our operations and as we farm in the ocean, warming water poses a significant challenge.

Steps we have taken include moving to rougher offsite farming sites where dissolved oxygen (DO) and water temperate are better for the fish, selectively breeding fish that perform better in warmer waters, and undertaking a joint trial with BioMar, a global feed company, to develop an easy-to-digest summer diet.

The aim of the current trial is to help the fish digest and convert feed in summer temperatures that are higher than their preferred range, this will directly improve fish performance and health. Given that warming waters are a global issue for salmon farming, it is expected that the research taking place here in Tasmania will have positive global implications.

Another example is our involvement in an industry selective breeding program. The Tasmanian salmon industry has been selectively breeding salmon for desirable traits since 2005, which has directly resulted in high performing stock that are adaptable to Tasmania's farming conditions. Selective breeding is a common practice that all sectors of agriculture undertake whether it is breeding strains of drought-resistant wheat, to cattle that produce less methane.

This program has been run through the SALTAS hatchery at Wayatinah, and sees brood stock that perform well in key areas going on to produce the next generation of salmon. Desirable traits include better growth, increased amoeba resistance, later sexual maturation, better flesh colour and lipid levels for improved flesh quality.

Since the founder populations in 2004-2006, there has been a steady increase in genetic gain where growth potential and amoeba resistance have improved by roughly 2-3 per cent per year. Another result from the early stages of the trial putting fish to sea which required fewer treatments for Amoebic Gill Disease (AGD).

Approximately 200 families of salmon are in the program each year, and each company has rights to a percentage of these based on their financial shareholding in the program. Individuals from these families are electronically tagged and reared at sea and their performance monitored in "real world" conditions, i.e. increasing water temperatures, amoeba challenge, algal blooms and so on. The family performance information from the sea then informs us which are the best families to breed from (from siblings remaining in freshwater).

The volume of genetic data that has been amassed from this breeding program is so large that CSIRO, who are partners, had to significantly invest in new ICT to analyse and store the results.

As an aside, **does the Committee know that salmon farming emits less carbon dioxide than meat production** and leads the way across primary industries in terms of feed to food conversion? Over all the different farmed animals, the Global Salmon Initiative (https://globalsalmoninitiative.org/en/) has found that the Feed Conversion Ratio (FCR) of salmon is the lowest of all farmed animals. The FCR indicates how efficiently an animal converts feed into meat or simply, how many kgs of feed are needed to product 1 kg of meat/protein.

While a kg of beef meat requires between 6-10kgs of feed, a kilogram of salmon meat requires just 1.2-1.5kgs!

C for Collaboration

Huon has consistently and vigorously encouraged collaboration across the salmon industry, government, community and research partners. The long-term sustainable success of the industry (and the employment of thousands of Tasmanians) relies on respectful collaboration across all these parties.

This principle was demonstrated in August 2017, when Huon released its White Paper (Tasmanian Salmonid Industry Sustainability Framework - https://www.huonaqua.com.au/huon-releases-

discussion-paper-calls-international-symposium-salmon-farming/) which outlined Huon's vision for ensuring a future sustainable Tasmanian salmon industry, where Tasmania was at the forefront of world's best practice and where the hard lessons from catastrophic industry collapses elsewhere were embraced to ensure that such collapses never happen in Tasmania.

Huon's belief was that Tasmania had (and still has, but perhaps only just) a once in a generation opportunity to establish a strong framework to guide the safe, sustainable growth of a world-class salmonid industry. Huon encouraged the bringing together of international experts to Tasmania to meet with legislators, government, regulators, stakeholders and the wider community to share experience and build trust in a transparent and informed way.

The White Paper was a significant undertaking by Huon and led to the Blue Future Salmon Conference in December 2017. International keynote speakers were invited to attend representing science, research and development, regulation and leading CEO's. The three-day event saw in excess of 130 people from government, industry, the research sector and the community take part in nine workshop sessions focussed on three key themes:

- Biosecurity
    - Biosecurity status and future risk
    - Biosecurity planning
    - Production management
- Environment
    - Global issues, the Tasmanian context and public perception
    - Environmental requirements for planning and regulation
    - Information management and transparency
- Future Farming
    - Offshore aquaculture
    - Land based/Recirculating aquaculture systems (RAS)
    - Integrated multi-trophic aquaculture (IMTA)

The event was a collaboration between Huon, Tassal and Petuna, the Tasmanian Salmon Growers Association (TSGA), the Tasmanian Government, the EPA, the FRDC, IMAS and the University of Tasmania. A conference report was generated which summarised discussions and outcomes. https://www.imas.utas.edu.au/__data/assets/pdf_file/0009/1218159/Planning-for-a-Blue-Future-Report.pdf

It is the opinion of Huon however, that while the conference clearly and transparently shone a light on both the short and medium term government, regulatory and industry challenges, significant and key international relationships were established. However, the outcomes as documented were not acted upon promptly and therefore an opportunity to establish the Tasmanian industry, its scientific community, university and regulators at the forefront of being thought leaders and positioning ourselves at the forefront of the global industry was lost. Ongoing committee collaboration is a core and effective way for Huon to meaningfully and sustainably capacity build among local communities. Our participation and committee efforts pave the way for us to proactively advocate, share knowledge, expertise and support our neighbours and staff communities - to plan and build projects and initiatives to grow a resilient and informed communities statewide.

Across the business, Huon is actively represented in over many committees. For example, as founding committee members of the *D'Entrecasteaux Huon Collaboration* and the *Derwent Estuary Program*, we collaborate, manage and fund education/research initiatives to improve the condition of the local waterway(s). In the West Coast, Huon places its focus on initiatives to establish vital services and assets in the region via the Council's *Education Advisory & Training Committee* (ETAC) and *Destination West Coast*.

Huon has proven consistently over decades its position of welcoming collaboration to the betterment and success of our industry. Our position on collaboration as a company sees us at a leading light in global innovation and research.

C for Communities (Regional)

Regional communities are the backbone of our farming operations; 75 per cent of our workforce have a non-urban postcode and coupled with the hundreds of contractors, suppliers and businesses we use across the Huon Valley, the Derwent Valley, the North East, the Latrobe municipality and the West Coast, we know the importance of regional Tasmania.

Aquaculture provides tremendous opportunities to create a critical mass of highly skilled, employed families that can keep regional communities alive and thriving and growing–something that should never be under estimated.

Huon currently employs 720 people (every Committee member would know at least one) who earnt more than $55m in the past 12 months while the company paid $3m in payroll tax to the State Government. These highly qualified, talented Tasmanians are passionate about this State and their communities; which is why they chose to develop their careers here, raise and educate their families and participate in community activities in rural and regional towns across the State. They spend their salaries here, paying personal income tax which is returned to Tasmania in the millions and also support the local fire brigade, the Lions Club and the next generation of athletes (like so many other people in regional communities).

We invest heavily in regional suppliers (most of which are Tasmanian owned); from transport companies to clothing manufacturers, to local trades businesses; in the past year, Huon spent in excess of $140m

purchasing goods and services from Tasmanian businesses; your neighbour (the plumber), to your daughter's footy coach (who drives the fuel truck), to the café down the road.

In addition, we donated around $120,000 last year through community grant schemes and small sponsorships most of which goes directly to small regional community groups that work so hard to build capacity and resilience in regional communities. This was in addition to the thousands of dollars provided in product to schools, community organisations and fundraising events.

Ultimately the biggest thing our industry offers, much more that an economic contribution (which it does in spades), is that it offers our rural communities a lifeline, meaningful employment opportunities, sustainable and ethical food production, and the chance for our bright young minds to stay in Tasmania– and that can only be good for the future of our state.

C for Compliance

As a fully vertically-integrated company, Huon's **compliance obligations** span across all aspects of its operations; from managing emission levels from our processing factory smokehouse, to obtaining development approval for permitted building works, to monitoring nutrient outputs from hatcheries and maintaining locations of on-water markers in our marine leases. Our regulatory bodies include State Government (DPIPWE), EPA, local planning authorities, Federal Government (export controls) etc.

The Tasmanian legislation and regulations applicable to our operations range from the Crown Lands Act, Dangerous Goods and Substances Act, Environmental Management and Pollution Control Act, Inland Fisheries Act, National Parks and Wildlife Regulation etc.; some 40+ pieces of legislation. In addition, each active marine lease is subject to controls outlined in an Environmental Licence and a Marine Farm Licence (publicly available via https://maps.thelist.tas.gov.au/listmap/app/list/map).

To streamline this process and to support our employees, a small Environmental Compliance Team was established in early 2019. To support and improve compliance across the company, the team provides two dedicated full-time employees, a centralised point of contact as well as conducts proactive site audits and gap analyses. The team also liaises with relevant stakeholders which can range from local councils to the Federal level of government.

In addition to establishing this team, Huon also holds monthly meetings with a broader Compliance Management Group. These meetings provide an opportunity for people from across the business to collectively discuss compliance.

Also see E for Environmental Monitoring which outlines the range of testing and monitoring surveys undertaken across the company.

C for Continuous Improvement

To continue to grow responsibly and remain at the forefront of our industry **we must constantly improve,** to continue to make substantial advances in our farming operations to ensure we remain sustainable industry and a company that is focused on the safety of our employees, the welfare of our fish and the wildlife around our farms.

A strong example is our Freshwater Improvement Programme (FIP).

While there is no evidence of any environmental harm occurring down stream of existing freshwater facilities attributable to site operations earlier this year, Huon implemented (voluntarily) a FIP for all our hatcheries and nursery sites. The FIP delivers uniformity of operational requirements across sites but more importantly to place a cap on discharge limits and site biomass capacities, to reduce the potential for any adverse environmental impacts.

Many of these sites have operated in regional Tasmania for many years and due to extended heritage in certain areas have been integral in the development of salmonid aquaculture in Tasmania. Through the implementation of the FIP Huon will be able to provide certainty around water quality discharging from its facilities while also securing the future of these sites and the staff employed.

The data collected will continue to ensure Huon can readily identify where improvements could be made to further improve site discharge water quality. The FIP does not increase production at these facilities from their current maximum production levels and sampling results are provided monthly to the EPA Tasmania directly from the NATA approved laboratory conducting the analysis.

We fully understand the importance of establishing discharge and uniform site management conditions to provide for a sustainable salmonid industry. It would be an excellent outcome for Tasmania if this model was also adopted for all terrestrial farmers and water and sewerage utilities.

Unprompted, as part of FIP, over the past two years we have installed improved waste capture capabilities at Bridport, Millybrook and Meadowbank hatcheries to reduce waste outputs even further without increasing biomass and we are continually looking at where we might use new, developing technology to further improve waste and nutrient capture at each site.

Huon also holds a number of international certifications that cover everything from worldclass farming certifications to strict packaging and food safety standards; all are aimed at continuously improving our output.

Global G.A.P. is an internationally recognised standard for farm production. Unlike some other 'accreditations' or 'standards', Global G.A.P isn't a marketing partnership, rather it presents an opportunity for the facilitation of ongoing, continuous improvement. In 2012, Huon became the first Australian salmon producer to achieve this internationally recognised accreditation; a pre-farm gate standard that covers the whole production process of the certified product from the hatchery until the point of harvest and packing.

To this day, Huon has maintained this standard. To achieve this, continuous improvements have been made across the entire business in addition to complying with numerous third-party audits, and site assessments. The health, welfare and biosecurity of Huon's farmed salmon is critical within this Standard which is why Huon's Veterinary Health and Biosecurity Plan forms a core platform against which Huon operations are assessed at audit.

In 2019, an independent overseas auditor spent two weeks undertaking visits to 18 sites assessing Huon's operations against more than 200 compliance criteria. Continually meeting and exceeding these criteria would not be possible if it weren't for the hard work and innovation of our employees.

Huon is also a BRC AA-rated seafood processor—the BRC Global Standards specify requirements to be met to enable the production, packaging, storage and distribution of safe food and consumer products. Originally developed in response to the needs of UK members of the British Retail Consortium, the Standards have gained usage world-wide and are specified by growing numbers of retailers and branded manufacturers in the EU, North America and further afield. Once again, an independent auditor visits from overseas to undertake this audit.

Huon's Parramatta Creek processing facility first achieved BRC AA rating in 2016; at the time, we were the first seafood processing facility (and remain the only) in Australia to achieve this rating (by way of comparison, over 16,000 sites world-wide hold BRC certification).

Huon is also HACCP certified. Safe food production is achieved by applying HACCP techniques to ensure that potential hazards during the process are recognised, monitored and controlled and finally, Australian Quarantine and Inspection Service (AQIS) undertakes a regular inspection and certification process for our products sold overseas.

Also see R for RSPCA for details of Huon's inclusion as Australia's only seafood farmer into RSPCA's Approved Farming Scheme.

Also see R for Research & Development

C for Correcting the Record

Including this section in this submission is not Huon's preferred action but given the industry is constantly (wrongly) accused of a range of harmful environmental actions, through to potentially defamatory statements against individuals working in the industry, it is important the Committee is fully informed, and the record is corrected.

As an example, TAMP (Tasmanian Alliance Marine Protection) now blocks contrary or negative comments (not just from salmon farmers) on its social media pages. Despite claiming it is a transparent organisation, the action of hiding comments indicates it is not open to any informed debate.

This same group recently held an open, public forum to discuss this Inquiry and representatives from Huon attended. After the event correspondence was received from the group complaining about our presence; yet at the same time on TAMP's Facebook page Huon was praised for attending.

The Committee will read the submission from SEMP (South East Marine Protection). Incredibly, after Huon pointed out to SEMP a number of false statements in its already publicly available submission to the Committee (posted on Facebook), SEMP responded "Thanks for the information, I put the submission up as an opportunity for interested parties to fact check. We'll have another look and make the necessary changes. Cheers".

It is an indictment on our community that an environmental activist can make false claims, which potentially impact on the livelihoods of thousands of aquaculture employees yet not be held accountable.

The industry has also been subjected to false accusations from other fisheries; the Tasmanian Abalone Council has a view that the loss of abalone productivity is related to salmon farms.

The scientific evidence says the exact opposite.

Broadscale Environmental Monitoring Program (BEMP) 2017 (independent monitoring provided to the EPA) found "no evidence of any major broadscale impacts of salmon farming in the Huon/D'Entrecasteaux Channel region".

Further, in a submission to the State Government regarding the Growth Plan (September 2017) the Council went on to claim that "The burgeoning Tasmanian salmon aquaculture industry has long been identified by the Tasmanian abalone industry as posing a potential risk to the health of delicate inshore reef systems. There is a commonly held view amongst many commercial abalone divers who harvested abalone in the D'Entrecasteaux Channel during the seventies, eighties and nineties that the benthic community in some sections of the lower Channel has altered in a way that is less supportive to habitation by abalone and other benthic reef dwellers that were once abundant in this area".

Further, TAC stated "It is a widely acknowledged fact that salmon aquaculture has a detrimental effect on water quality and substrate characteristics in close proximity to farming operations". As an aside, a report released by leading academic Professor Colin Buxton debunked these claims. https://www.researchgate.net/publication/283257123_REVIEW_OF_THE_TASMANIAN_ABALONE_COUNCIL_REPORT_ON_RISKS_TO_THE_ABALONE_FISHERY_FROM_FURTHER_EXPANSION_OF_THE_SALMONID_INDUSTRY

Huon **believes science is the best way to resolve these concerns, not "commonly held views"** unsupported by any research or evidence. We always invite those with accusations to provide proof to back up their claims so we can conduct an investigation, however this falls on deaf ears.

Another issue Huon has been blamed for is the reported reduction in handfish in Tasmanian waters. Handfish face a number of threats to survival including habitat destruction and loss (anchors of vessels easily destroy sensitive habitat), predation by Northern Pacific sea star and sea urchins, poaching to supply illegal aquarium trade, pollution, and climate change. Handfish have been sighted on several of Huon's leases which indicates that salmon farming does not have an impact on handfish habitat or population. These sightings are reported to the State Government and the Institute of Marine and Antarctic Studies (IMAS) so we encourage the Committee to seek confirmation from these parties.

See Appendix 8 (Fact Sheet – Handfish) for details on the State's recovery plan.

The industry has also been on the receiving end of opposition to expansion in the waters around King Island. Huon has repeatedly made numerous public statements that we will never farm in the area yet the environmental activists consistently repeat their claims.

Even more frustrating is that North West and King Island-based surfers, who have been highly critical of salmon farming, recently participated in a nationwide paddle protest against oil drilling in Great Australian Bight and professed support for the aquaculture industry...there could be a "serious potential effect on aquaculture from any oil spill".

One consistent allegation which has been ongoing now for nearly a decade is in respect to our hatchery at Lonnavale on the Russell River.

The overwhelming scientific evidence gathered over many years and the onerous monitoring requirements outlined in the Environmental Protection Notice for the site have, at huge continuing expense, proven over and over again there is no evidence of any contaminants or pollution coming from that site into the river. However, none of this evidence has or will stop the accusations.

Imagine if you will a seaside resident constantly calling you or your staff at any hour of the day raising accusations of highly lit, noisy vessels on the water. When you provide evidence to the contrary it is not accepted.

Imagine being told by another seaside resident they want vessels to go past their house at a fast speed on a certain course while a person on the opposite side of that waterway demands our vessels take another course and go slower or indeed preferably not commence work until after 9.00am.

During the construction of the Whale Point nursery, one resident who lives two kilometres from the site attended the site brandishing a chainsaw threatening construction staff because they dared to begin their working day at 7.30am on a weekday. That same person then blocked the road with a locked

vehicle stopping hundreds of construction staff lawfully attending to their duties. Sadly, the only way forward for us was a restraining order as our staff were threatened with violence.

Huon has always taken enormous pride in acting respectfully, openly, honestly and working collaboratively with those that may have a particular issue but of late, respectful behaviour from accusers is becoming non-existent which makes it difficult to engage and work together to achieve an outcome.

D for Dashboard and Disclosure

Huon leads the Tasmanian salmon industry in terms of transparency of information and data, and we were the first globally to develop an interactive online **Sustainability Dashboard** - https://dashboard.huonaqua.com.au/

This Dashboard came about by a desire to be more transparent in our farming operations, and to provide members of the community with information which they were seeking out via on online portal. Today, data presented on Huon's Dashboard includes wildlife interactions, temperature and dissolved oxygen data, underwater footage, employee figures, and research spend.

In recognition of our commitment to real-time data reporting, our Sustainability Dashboard recently took out the inaugural Contribution to Sustainable Development or Protection of the Environment award at the 2019 TasICT awards.

There is no legislation or statutory regulation (whether active, amended or repealed) that requires public reporting of stock mortalities across any agricultural industry in Tasmania however, in accordance with our licence conditions we report in real time, to both the State Government (EPA, DPIPWE and Office of Chief Veterinarian) and RSPCA in relation to fish mortalities.

On another note, in relation to open disclosure, over the past few years, Huon has tried unsuccessfully to invite numerous politicians, ENGOs, activists and general industry detractors to come for a tour of our farm sites. Almost without exception this offer has been declined (Huon is currently in process of engaging with Neighbours of Fish Farming who have accepted offer). This includes members of the Australian Greens (at both State and Federal level), environmental activists including Environment Tasmania and vocal journalists such as Charles Woolley.

It has always been Huon's position that engagement and disclosure is the only way to build and develop a sustainable business. Now as a publicly listed entity that position has been further enhanced. We question and challenge the Committee to consider that while the industry is often accused of lack of transparency, the opposite is the fact.

Increasingly, we have evidence of many claims on social media that are incorrect. When we make respectful comments with evidence to counter those claims we find that our "posts" are either removed or we are "blocked" entirely from those sites.

Huon's position is that disclosure is a two-way street and we question the motives of those that either undertake these inaccurate claims or continue to decline the opportunity to avail themselves of the real and substantiated facts.

Plausible deniability is not an accepted position for either us or those stakeholders who publicly criticise our business or industry.

D for Demand (Worldwide)

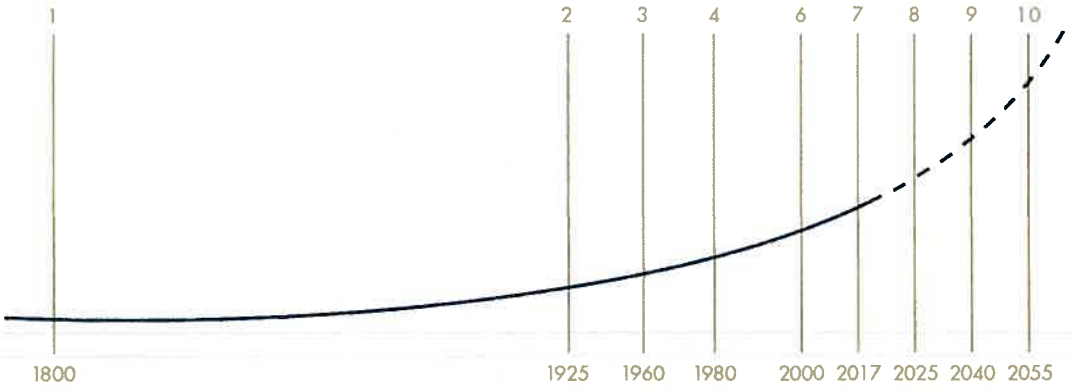
Aquaculture is globally recognised as essential to meeting current and future food needs. World demand for salmon is currently outstripping supply growth and this is forecast to continue for many years.

With our future protein to be sourced from the untapped potential of the ocean (which comprises 70 per cent of the world's footprint), the industry is in a growth phase and one which needs to be sustainable to meet future generations' needs. Tasmania is responsible for delivering more than 60 per cent of Australia's aquaculture, due to its temperate climatic conditions which are optimal for growing salmon.

With the projected global population growth at 9.4 billion by 2050, forecasts suggest that by 2025 alone an additional 11.4 million tonnes of seafood will be required to satisfy the projected global market demand–an additional 35 per cent relative to current production supply.

GLOBAL POPULATION GROWTH 9.4 BILLION BY 2050

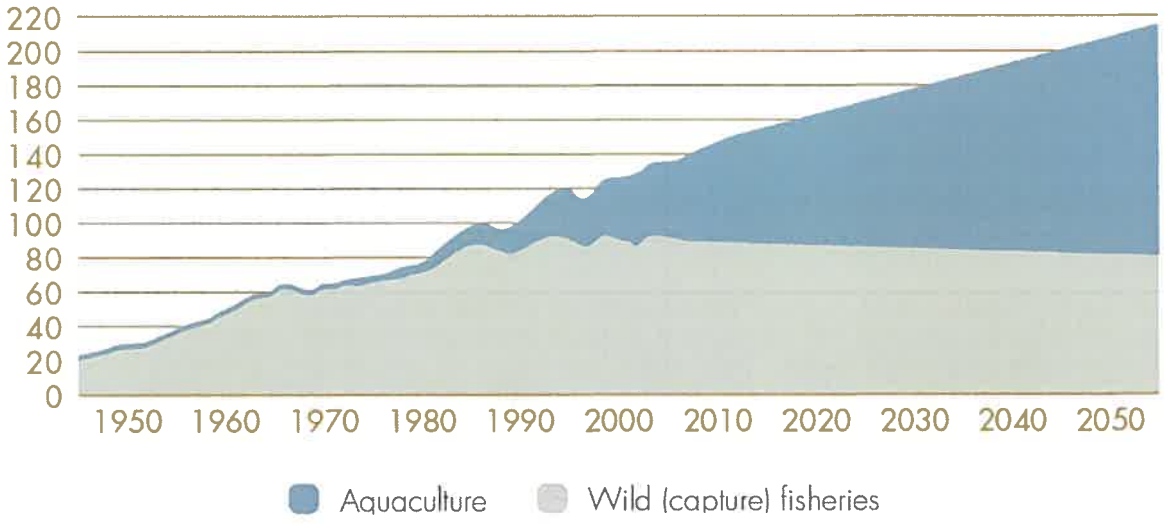
Years when world population reached increments of 1 billion. Source: United Nations, Department of Economic and Social Affairs.



Wild caught fish is a finite supply and NOT because of salmon farming. Stock assessment data (FAO. 2018. *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals.* Rome. Licence: CC BY-NC-SA 3.0 IGO.) highlights that wild fish stocks have declined much more significantly in places where no salmon farms exist. Various government authorities and research bodies acknowledge that the reasons for declining stocks are complex and cite predators (seals), over-fishing, hydro-energy, marine pests, algal blooms, recreational fishing, forestry and agricultural run-off as contributory factors.

Sadly, Australia still imported 66 per cent of seafood in 2016-2017 (Mobsby, D 2018, *Australian fisheries and aquaculture statistics 2017*, Fisheries Research and Development Corporation project 2018-134, ABARES, Canberra, December. CC BY 4.0.) and with the increasing focus on good food provenance those volumes will be challenged, and rightly so. Fortunately, salmon (and Tasmanian salmon) continues to have the larger portion of Australian dinner plates, as people turn towards healthier, more sustainable sources of nutrition.

AQUACULTURE v WILD (CAPTURE) FISHERIES



The Australian Government has recognised the need to achieve responsible growth in our critical sector and the importance of a Blue Economy for our nation's future. Given salmon farming accounts for 60 per cent of aquaculture domestically, the social and economic benefits that a blue future can provide are significant and meaningful for Tasmanian communities.

E for Economic Value

In 2017-18, the total gross value of the Tasmanian agriculture industry was $1.6b **while the Tasmanian salmon industry was valued at $838m**, significantly greater than dairy $429m, beef $337m and potatoes $123m. The State Government's own figures provide evidence that the growth in Tasmania's agri-food value is due to the salmonid industry. In comparison, the abalone industry has an economic yield of $91m per annum while the rock lobster industry's yield is $99m, as reported in the *Tasmanian Agri-Food Scorecard 2017-18 page 2 and IMAS Economic and Social Assessment of Tasmanian Fisheries 2016-17.*

In the past five years alone, Huon has spent nearly $141m in purchasing goods and services from Tasmanian contractors and suppliers. The importance of regional Tasmania to the salmonid industry cannot be underestimated. Collectively, the three companies directly employ more than 2,300 Tasmanians in addition to hundreds of contractors, suppliers and businesses who each benefit from this $1b industry.

Every year, Huon pays the State Government around $1.1m in marine farm levies, calculated on a user-pays basis. These payments are in addition to the rates paid to seven municipal councils, plus the $3m (and growing) to the State Revenue Office, plus the investment in professional learning and training for our workforce. This is in addition to Huon's $55m annual payroll for our 720+ workforce who live in 22 (of the 29) municipalities in Tasmania (see C for Communities for further information on the company's economic investment in Tasmania).

As fierce brand ambassadors, we also support many regional and state food and beverage shows, promote Tasmania across the globe, are proud members of Brand Tasmania (for more than 15 years) and display the Brand Tas logo on packaged products sold across Australia and internationally. On every occasion that we have been approached Huon has supported branding initiatives at international functions, trade shows, dinners for visiting high profile dignitaries and celebrities.

Huon has also mentored and supported many small and micro Tasmanian producers at both Brand Tas events or Huon specific international trade events utilising other ingredients (wines, ciders and spirits) to showcase the breadth of amazing produce available in Tasmania. Huon's attitude to this has always been that as a now larger producer we have the corporate capacity to provide the critical mass of both funding and resource to help grow the Tasmanian brand. We were once a small producer and understand the very real constraints to a business endeavouring to market on a competitive world platform.

We are proud that Tasmania is finally being recognised not as some backwater state, but as leaders in sustainable food production and for that matter, at the forefront of innovative salmon farming globally.

Salmon farming is also an **efficient** way to produce food. Based on value only, salmon farming is conservatively 153 times more efficient in its return per hectare than land based agriculture (value efficiency multiplier). Agriculture (excluding seafood/aquaculture) was valued at $1.6b to the State returned a value per hectare of $2,048 vs the salmon industry (valued at $838m) returned a value per hectare of $313,858.

This figure is based on the industry's total marine lease space in Tasmania (and not all lease space is currently in use) of 2,670 hectares compared with just over 780,000 hectares actively used and occupied by agricultural farmers.

Source: ABARES – Active agricultural land in Tasmania occupies 781,216 hectares; DPIPWE Marine Farm Branch.

https://www.agriculture.gov.au/abares/research-topics/aboutmyregion/tas#agricultural-sector

E for Environmental Monitoring

The impact of Huon's operations on the environment has been the subject of 30+ years of scientific investigation. A variety of reports, surveys and research exists covering a range of potential impacts, from benthic (seabed) changes, near-farm seafloor, and broad scale (far from farm) water quality changes.

Huon complies with a range of environmental monitoring processes–some for the regulator (the EPA), some for compliance reasons (for MAST, Marine Farm Branch) and some because we believe it's important while yet another set of monitoring is linked to research collaboration.

Details of our Broadscale Environmental Monitoring Program can be read at B for BEMP.

Before commencing farming at a new site, **a baseline survey** is conducted to establish and document baseline environmental conditions. This process involves looking at approximately 30 ROV (remotely operated vehicle) dive sites within the lease boundary and 34-40 sites outside the boundary. In addition to visual surveys, sediment and core samples are also taken. Each operational site is surveyed by ROV every 3-4 weeks and this data, together with the baseline, allow us to monitor any changes in the seafloor to ensure that our farming operations remain compliant with legislation. This data is provided to the EPA as part of Environmental Licence conditions. We also under environmental surveys post fallowing.

On top of our baseline surveys, we also conduct **annual video surveys** for the EPA and for inclusion in our internal reports. During these surveys, we record everything we see on the seafloor and make written observations to accompany the video findings. In our observations, we look at the physical properties of the floor, what species are present, and whether there are any fish feed pellets, or salmon faeces visible. We also send GPS files to show where our reports are based down to the metre.

Conducting annual surveys has allowed us to collate a comprehensive record of the history of Huon's interactions with the environment in which we operate. This has allowed us to better plan our fallowing process, understand our environment and innovate our practices to continually minimise the impact of Huon's farming activities to the natural environment.

Another component of our environmental monitoring is odour testing, when required as per our Environmental Licence.

Huon, and the industry, is often accused of lack of transparency. **Here's an example of full transparency**, delivered in real-time between Huon and the EPA, the industry's environmental regulator.

Huon uses Splashback, a data management software, to share environmental monitoring data from hatchery sites across the company with the EPA; as the data is loaded into the system it is instantly accessible by the EPA. Wastewater produced at our processing facility is also recorded (and accessible by the EPA) in Splashback. The use of this software, and indeed the real time access to the data, is NOT a condition of our Environmental Licences with the EPA yet Huon has recognised the benefit of sharing information.

E for Escape

Another issue which the community has incorrectly associated with the possible damage to wild species is fish escapes.

On rare occasions, fish escapes can occur. This is typically when a fish containment net becomes compromised/torn due to a storm event or infrastructure malfunction.

A significant fish escape is defined as "*any loss of licenced species to the marine environment in excess of 500 individuals at any one time*" – as per Environmental Licence (G3 section 7). The EPA is notified when such an event occurs, as is the DPIPWE Marine Farming Branch. 500 individuals can constitute less than 0.4% of a pen population, so when an escape occurs (net/pen is compromised due to Mother Nature), it can on occasion be difficult to identify the exact timing of breach. We can be made aware of this by the immediate seal response (active feeding) in the localised area and as soon as the area of failure is evident it is immediately rectified.

If we suspect a significant escape event has occurred, we notify the EPA and Marine Farm Branch immediately and then update once we have facts. Other reported information is sourced from our comprehensive stock data base which includes number of fish, average fish size, predicted escape number, lease and pen of possible escape (although disclosure of this information is not required in the EL).

We also have the ability to count the number of fish in a pen every time we bathe with very sophisticated counting equipment on our wellboat, however a reliable count can be challenging depending on fish size when trying to detect a < 0.4% loss. To minimise stress, we only handle the fish when it is absolutely necessary e.g. during gill checks or bathing.

Huon is very cognisant that fish escape events can have broader consequences for the company, including direct financial at harvest, and indirect (ASX and insurance) as well as community concerns.

However, after decades of farming and studying previous fish escapes along with more recent scientific studies it is apparent that there is a very limited impact on local environment of fish escapes in Tasmania.

IMAS surveyed more than 120 recreational fishers about the location and catch numbers of the 120,000 salmon escapees (following the May 2018 storm). The report confirmed the salmon dispersal was largely restricted to south-eastern Tasmania, particularly within the general Storm Bay region, including associated bays and tributaries. Importantly, the report showed there was only limited feeding by the escapees on native fauna. We know this is consistent with previous studies (here and overseas) where farmed salmon generally don't appear to feed on native species as they are typically used to feeding on fish pellets. Tasmania has no native salmonids so there is no impact on wild genetic stocks (a problem in some northern hemisphere countries) plus escaped salmon typically don't last long, what the seals don't get, the fisherman quickly do!

The May 2018 storm dealt our extended community a once-in-a-Century challenge and while it's always difficult to respond to rare and unpredictable large-scale escape events the facts obtained through the IMAS survey will inform future operations.

https://www.imas.utas.edu.au/__data/assets/pdf_file/0017/1210544/Atlantic-salmon-survey.pdf

F for Feed Barges

Our feed barges house high-tech feed systems that utilise a video pellet-recognition system to determine when the fish are hungry, and when they are full (thereby stopping the feed supply). In this way, we allow the fish's natural behaviour to determine when and how much they feed. Similarly, our feed system allows all fish to feed at the same time; fish are fed at dawn and dusk which is salmon's preferred natural feeding time.

We use a patented feed spreading system that distributes the feed over a greater area of the pen allowing less dominant fish equal access to feed from anywhere in the pen resulting in efficient and consistent fish growth.

The technology allows less wastage and therefore reduces Huon's overall environmental impact. The real-time video footage captured by the system also allows extensive monitoring between feed times.

By utilising remote operations Huon can feed fish, inspect nets and other infrastructure, remove mortalities, and monitor the environment remotely from our Hobart office. Feed barges also allow us to monitor wave actions and current buoys, as well as capture live video feeds of the weather conditions.

The feed barge's mounted, centralised feed systems provide better reliability and consistency of feeding due to minimising downtime when staff couldn't safely access the feed hoppers (used prior to feed barges).

Huon has invested more than $45m in our fleet of six operational feed barges (seventh due to be completed in early 2020).

See Appendix 5 Fact Sheet – Feed Barges for specific details about Huon's fleet of feed barges.

F for Food Safety

All of the fish Huon produces is primarily processed at a single facility, at Parramatta Creek (PMC) near Devonport, which makes food safety variables easier to control. From here, whole fish, fillets or valued added products are dispatched for sale or are sent to our new Ingleburn Factory in Sydney for further value-adding and dispatch to local customers along the eastern seaboard of Australia.

PMC was designed, built and is managed with a strong focus on food safety which is why we hold British Retail Consortium AA rating (and have done since 2016). We are the only seafood processing facility in Australia to achieve this rating which is a testament to our focus on food safety and continuous improvement.

We also have an on-site Quality Assurance team who work tirelessly to audit and conduct daily onsite testings to continually improve our processes and as a result, we have not had a single product recall since processing operations commenced in Tasmania.

PMC is independently audited multiple times per year (by independent auditors) to comply with our certification requirements and to ensure excellence when it comes to food safety.

Also see C for Continuous Improvement.

F for Fortress Pens

At Huon, we have pioneered global industry leading technologies including our double-netted Fortress Pens, which is integral to the successful expansion of our farming operations into offshore waters.

The Fortress Pen system was developed in-house by our team in response to a need to keep seals out, provide a safe platform for our staff to work on and allow us to farm further offshore. Nothing was available on the global market, so Huon underwent a two-year, development research project with funding support from FRDC.

Huon's Fortress Pens have been designed for, and now tested in, some of the toughest Australian conditions at Storm Bay, Tasmania and Providence Bay, New South Wales. This has led to continual improvements to the Fortress Pen design. These sites are high energy, exposed sites, frequently receiving storms swells and gale force winds.

When introduced, Huon's Fortress Pens were a world first; a fully enclosed walkway, nets made out of the same material used to make bullet proof vests, a two-net design to keep seals away from the fish, and fish away from the seals. The design included elements of windsurfer technology to withstand the buffeting Tasmanian winds as well as accommodate cutting edge, in-situ net cleaning technology for the first time in Australia.

Huon revolutionised pen design for the industry globally and the company (a tiny player in world salmon production) is extremely proud to be at the vanguard of the industry in terms of ingenuity, invention and preparedness to invest in new ideas and improvements. Our technology has been patented and now available to be sold internationally.

See Appendix 16 Fact Sheet – Storm Bay AND Appendix 20 Fact Sheet – Wildlife Interactions for additional details about Huon's offshore farming equipment.

G for Government

The Tasmanian salmonid farming industry warrants reasonable, appropriate policy, regulation and planning that is informed by the best science, which is exactly what is the case in this State. The legislation, regulation and processes that underpin our industry are robust and most importantly, backed by science.

Government has an important role to play in setting policy and legislation direction for the industry. It also has a role in creating an economic framework that enables industry growth while also protecting Tasmania's unique environment. These components are essential if subsequent generations of Tasmanians are to remain living here, moving through the important stages of their personal and professional lives.

We encourage government to remain contemporary in respect of accessing the best advice and expertise from all over the world to ensure the industry remains viable and sustainable. Innovative industries like the salmon industry are springing up all over Tasmania and this government must ensure its regulatory, policy and social agenda is in step.

What is also essential is for all layers of government, regardless of their political colours, to celebrate and admire the salmon industry. It is a fact that both major parties appreciate the industry and what it brings daily to our state and that is a good thing. What would be even better is if the Committee, and indeed all members of the Legislative Council, came for a visit to our farm. No questions are off limits.

We have, and will continue to, work with government and other regulatory authorities. There is no question that each party has an important role to play. We have already demonstrated our commitment to supporting whole of government strategic policy (such as our input into new Biosecurity Regulations). For the future sustainability of the industry it is vital that everyone understands the scope of their role.

H for Health (Fish Health)

All good farmers take a proactive and holistic approach to safeguarding the health and welfare of their stock. At Huon, this involves feeding quality diets, good site management, fish husbandry, biosecurity measures and of course, vaccinating our stock.

The welfare of our fish is a priority for us; every farmed animal has the right to move and behave normally (which is why, in 2018, we were named as Australia's only RSPCA Approved Salmon Farmer).

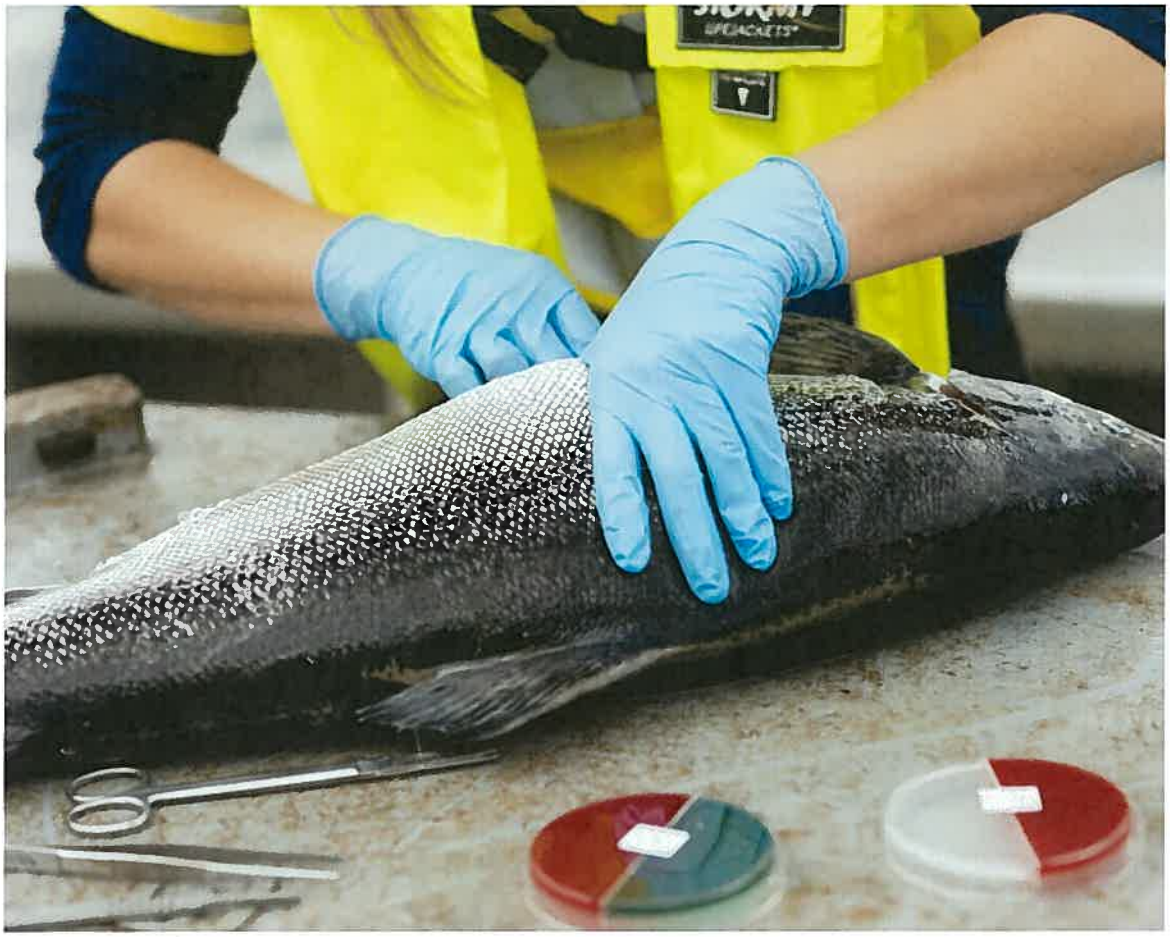
Effective management of fish health, welfare and biosecurity is critical to successful aquaculture.

Huon takes fish, welfare and biosecurity very seriously which is why Huon employs two full time veterinarians. In addition to our two veterinarians, Huon employs 21 people with University qualifications encompassing one or more of the areas of aquaculture production, environmental science, fish health, welfare and biosecurity training and 115 employees who have completed, and 90 staff who are in the process of completing the Certificate 3 in Aquaculture qualification through the Seafood Training Tasmania. This course contains significant components on fish health, welfare and biosecurity.

Huon maintains a comprehensive Veterinary Health and Biosecurity Plan (VHBP) that forms the basis of all Huon's protocols and procedures to address fish health, welfare and biosecurity matters. The VHBP is regularly reviewed and updated.

In respect of vaccine development, significant investment has been made by all companies and across the industry vaccines are now commercially used to successfully control up serious disease pathogens. In 2019, Huon along with other salmon companies have vaccinated many of the 2019-year class smolt with prototype POMV vaccines and it is expected that all 2020 smolt will be vaccinated with the most up to date prototype POMV vaccine.

Another way in which we look after our fish is through bathing in freshwater. Amoeba exist in the water (a single-celled microscopic organism) and can multiply and reduce water flow at the gill surface that can then limit oxygen supply to the fish. They are unique to the saltwater marine environment and cannot tolerate freshwater, whereas salmon can adapt between salt and fresh.



We bathe our fish in industry-tailored wellboats designed to transport and bath the fish in a seamless, low-stress environment. Using wellboats to bath our fish also allows Huon to transport all the fish in an enclosed system. This method greatly reduces the potential for disease transfer, improving our biosecurity practices and impact on our fish.

Huon was the first company globally to use a wellboat for the purpose of bathing fish in freshwater.

See Appendix 6 (Fact Sheet – Fish Health) and Appendix 3 (Fact Sheet – Biosecurity) for more details on our fish welfare practices including vaccination processes and use of antibiotics.

H for Health (Humans!)

The health benefits of salmon are well documented. It is dubbed as **one of only 14 known 'superfoods'** and the inclusion of salmon in human diet is now even more critical if the current population is to avoid becoming the first generation to have a lower life expectancy than its predecessor.

While progress has been made globally to reduce infectious diseases, cardiovascular, nervous and autoimmune system diseases are on the increase. And other diet-related problems such as obesity, depression and mental illnesses now rank as an even bigger problem for European populations.

Salmon is recognised as a superfood because of its nutrient profile and health-protecting qualities, making it a great way to fuel your body. The superfood status is a result of salmon containing large amounts of Omega-3 fatty acids and being low in saturated fat and calories yet high in protein.

In addition to cardiovascular benefits, a diet rich in Omega-3 has also been found to assist with easing joint or arthritis pain by decreasing inflammation as well as brain development and function. The human brain is 60 per cent structural fat and in order to function properly needs the right kind of fat (Omega-

3s) to make sure that signals are passed quickly and easily between the membranes of the brain cells. Omega-3 cannot be produced naturally by the body and must be obtained from food consumption.

Compared to other types of seafood containing beneficial Omega-3s, salmon is well above the average recommended intake (2,170mg per 100g compared with oysters at 150mg per 100g). The recommended weekly intake of Omega-3 is 4270mg, so just two portions of salmon (or 40 beef steaks) provides all the human body needs.

Salmon is also rich in high-quality protein (another essential nutrient to help the body heal after injury, protect bone health and maintain muscle mass), an excellent source of several vitamins (D, B6, B12 needed for energy production, controlling inflammation and protecting heart health) and a good source of Potassium.

Source: CSIRO Marine Research – Omega Oils in Australian Seafood and NHMRC Recommended Dietary Intakes https://www.nhmrc.gov.au/sites/default/files/images/nutrient-refererence-dietary-intakes.pdf

Also refer to R for Residue (Huon fish are regularly sampled for contaminants and the results are publicly available) and A for Antibiotics (Huon has not used antibiotics at sea since 2016 when a single pen was treated).

The claims that salmon are fed a diet that makes them unsafe for human consumption and that it contains contaminants and food additives are completely false. Salmon is the **same product that medical specialists actively encourage increased consumption for all the reasons outlined above.**

H for History

Huon Aquaculture was founded in 1986 in southern Tasmania by the Bender family as a diversification to the family farming business. At that point the business consisted of one pen of fish and one lone employee feeding fish by hand. Peter and Frances, while managing the family farm, were also involved in planting out Tasmania's first trellis apricot orchard and were also managing the fledgling salmon farm.

The Benders then purchased the salmon farm outright in 1994 from the family group and began as contract growers, selling their fish to other companies. In 2005 they stepped out from behind the contract grower model and the Huon Aquaculture brand was established.

As the business grew it soon became apparent that there was a need to control the process from egg to plate which lead to Huon becoming fully vertically-integrated having control over their own breeding stock and smolt through to processing and marketing. This was vital to ensure complete quality control and the ability to continue to innovate and strive for continuous improvement.

In the space of just a couple of years, Huon established a recirculation hatchery, acquired leases in Macquarie Harbour on the west coast of Tasmania, began processing its own whole salmon in leased premises and then purchased, renovated and commissioned its Parramatta Creek processing plant in the north of the State. This facility rare by global standards in that it has whole fresh fish coming in one end and smoked packaged product coming out the other.

In 2014, driven by Peter Bender, Huon launched an aspiration and futurist growth plan that saw the company change every aspect of their farming practices including moving further offshore into rough waters. This was made possible through developing, in house, world leading patented fortress pen systems, designing and constructing robust highly technical feed barges, designing and taking delivery of the world's first freshwater bathing vessel, and developing a remote feeding system utilising AI technology.

Our offshore farming has been further enhanced by the design, construction and commissioning of the southern hemisphere's first fresh water nursery and will come to completion once the world largest fresh water wellboat arrives in January 2020 (designed by Huon to enable an entire 240m pen of fish to be bathed at one time while also producing its own freshwater). The rollout of this world leading $400m capital investment has put Huon at the forefront of high energy farming with the ability to safely manage staff, the environment and its stock.

To enable this transition and growth, Peter and Frances sought the very best management team from around the world to work with the growing numbers of Tasmanian staff. The Tasmanian industry, while

relatively still in its "infancy" was more mature than countries such as Norway and Scotland, who have been salmon farmers for some years more.

The foresight, innovation, investment and values held by Huon has seen the company recognised as a world leader in many aspects of the global salmon industry.

I for Ingredients (in Fish Feed)

All feed ingredients are approved under the Australian Stockfeed and Petfood Regulations, governed by the Australian Pesticides and Veterinary Medicines Authority (APVMA).

The ingredients in salmon feed, like all stock feed in Australia, is rigorously controlled and audited.

Our feeds are formulated to meet a specification that changes with each stage of the salmon's growth, and our suppliers manufacture to this specification.

A small component of salmon feed comes from the marine environment, specifically fish meal and fish oil. These ingredients are sourced from responsibly managed fisheries and are often by-products of fish that are caught for direct human consumption. Huon's forage fish FIFO ratio (fish-in/fish-out) is 0.85 (global industry average is 1.68), which is lower in comparison to other salmon farmers around the globe. This is because our feed includes alternative proteins and starch (such as vegetable and land-animal by-products) which increases the sustainability of our operations.

Our salmon feed is made up of a range of ingredients including:

- Vegetable ingredients such as wheat, soya derivatives, corn gluten and vegetable oils. In a five (5) year period (2013 to 2018) the percentage of vegetables in feed has increased 50 per cent (now 60 per cent of total feed).
- Vitamins and minerals and Astaxanthin (Astaxanthin is a powerful antioxidant that salmon need for healthy muscle growth and egg production and which also provides the salmon the signature

orange hue to the flesh. Huon uses naturally derived Astaxanthin from bacteria). Astaxanthin is highly sought after and freely available at health food shops as a high potency human antioxidant.

- Meat and chicken meal, blood meal, and poultry oil. By using land-animal by-products in our feed, we are helping to utilise 'waste' from other farming, which improves the sustainability of both land-based and sea-based aquaculture farming production. The first feed provided to fish in the hatchery is imported because it is not currently available to our standard within Australia. This type of feed is strictly controlled by national biosecurity laws which ban the input of any meat, GM or poultry products. That ensures no risk of BSE (Bovine Spongyform Encephalopathy – Mad Cow Disease) or any other contaminants entering either our fish or waterways.
- Fish meal and fish oil, which is sourced from certified wild fisheries (typically small, bony pelagic fish that aren't generally used for human consumption) and the off-cuts from other fish species. Salmon farmers world-wide have been working on a fish oil and fish meal substitute for many years and we have reduced our use from around 45 per cent fishmeal to 15 per cent. Algae oil is now becoming commercially available and Huon will examine the merits of that form of oil.
- Equally as important as what is in our feed, is what we leave out--our feed does not contain ingredients of genetically modified (transgenic) origin. We never feed our fish growth hormones or growth promoters, nor does it contain pork or pork by-products but don't take our word for this–check out the websites of our major feed suppliers, Biomar, Skretting and Ridley.

  In Australia, these feed companies are legally required to disclose ingredient details which is why Tasmanian farmed salmon is a safe, nutritious, healthy and sustainable food.

J for Jellyfish

Jellyfish blooms have been occurring globally for a very long time (hundreds of millions of years).

There is **no conclusive evidence that jellyfish blooms are increasing** in frequency or severity globally according to peer-reviewed scientific literature involving numerous scientists from multiple countries.

Jellyfish blooms (**moon jellyfish) have been recorded as occurring in Tasmania before salmon farming** started in the state.

Moon jellyfish blooms occur in some years and not others in south east Tasmania. Gaps of several years with very low to nil moon jellyfish occur between significant jellyfish seasons. There is no evidence that moon jellyfish blooms are occurring with increased frequency or severity in south east Tasmania. The last significant moon jellyfish season prior to the 2018/19 summer was the 2012/13 summer.

There are a number of theories in regard to what environmental factors or combination of factors predispose to serious jellyfish years but there is still much to learn. Huon currently liaises and collaborates with a number of international jellyfish and environmental DNA experts both in Australia and overseas.

Internationally, when certain species of jellyfish bloom they are a potential threat to fish farming operations. This can be due to the stinging cells (nematocysts) in the jellyfish tentacles that contain toxins, or the blooms can suffocate fish if large blooms clog nets causing oxygen levels to significantly decrease.

The Tasmanian industry is no different which is why Huon monitors the waterways in and around our leases throughout the day on a daily basis; both on-water and via in-pen cameras located in every single pen to identify all pests and predators including jellyfish.

See Appendix 9 Fact Sheet - Jellyfish for additional information including links to research papers.

K for Kelp

We actively support a range of research partners.

We see significant benefits in **sharing our resources and expertise to improve outcomes across many industries** not just the salmon industry.

An example is our participation in a joint IMAS/The Climate Foundation project regarding giant kelp.

https://www.abc.net.au/news/rural/2019-11-11/seaweed-scientists-replanting-giant-kelp-forests/11680194

Giant Kelp has endless applications from being used in food and fertiliser, bioplastics, and high-value nutraceuticals. It also has the added benefit of being extremely fast-growing, providing habitat for numerous other species, and soaks up nutrients in the water.

There is just one problem: the warming Tasmanian waters have caused an alarming reduction in the size of the giant kelp forests in the State, in turn leaving valuable food-webs at risk.

The **strengthening of the EAC (Eastern Australian Current) is the primary reason for the decline in giant kelp;** the current travelling down the East Coast of Australia is too warm for our cool giant kelp and isn't providing sufficient nutrients for giant kelp forests.

This is why Huon is supporting IMAS and The Climate Foundation to cultivate warm-water tolerant strains on our Storm Bay farm and assess their potential for restoration of Tasmanian kelp forests—whether the ultimate goal is restoration or cultivation, identifying these strains is the important first step.

The research is being co-led by Postdoctoral Fellow, Dr Cayne Layton, whose team recently planted kelp seedlings on both Huon lease sites and control sites in Storm Bay. The growth and survivorship of the out-planted giant kelp will be monitored for approximately twelve months across the range of different conditions and seasons.

https://www.abc.net.au/news/rural/2019-11-11/seaweed-scientists-replanting-giant-kelp-forests/11680194

K for Knowledge Sharing

Huon staff knowledge remains at the forefront of the latest international information, trends, technology and innovation but importantly this knowledge is shared among colleagues and other industries.

For example, the fish health and biosecurity expertise developed within Huon is not only relevant to salmonid farming in Tasmania. **Huon veterinary staff also participate in the development of fish health and biosecurity programs for other aquaculture industries in Australia and overseas.** Examples include:

- Representation on the Steering Committee for the FRDC Aquatic Animal Diseases and Biosecurity Sub-program which is purely based on the level of expertise of Huon's chief veterinarian on this subject matter and not as a presentative of Huon, or indeed the salmon industry.

  The subprogram is responsible for coordinating FRDC funded research and development aimed at addressing priorities within the field of aquatic animal health and biosecurity nationally, with a focus on infectious diseases of aquatic animals. The subprogram adopts a special responsibility for national health and biosecurity-related research to address issues of new and emerging aquaculture species.

- Representation at the Federal Sea-cage Biosecurity Guidelines Workshop

  Sea-cage finfish (non-salmonid), including Southern Bluefin Tuna, Yellowtail Kingfish and Cobia industries do not currently have a nationally agreed farm biosecurity plan guideline. A nationally agreed biosecurity plan guideline for sea-cage finfish (non-salmonid) will provide a set of minimum requirements to encourage the adoption of nationally consistent farm biosecurity.

  The Federal Government is keen to harness the learnings from the aquaculture industry (which in 2016 finalised a national Aquaculture Farm Biosecurity Plan) to support the development of

other sector specific biosecurity plans; Huon is represented in these discussions by our chief veterinarian, Dr Steve Percival.

- Representation on the Scientific Advisory Committee for the Gill Health Initiative which was formed to bring together industry and researchers globally, with the following goals:
    - Focus on key research areas that will inform best practice management of gill disease;
    - Promotion of exchange between researchers and industry for faster information sharing; and
    - Streamline research efforts across Norway, Scotland, Ireland and Australia.

The Tasmanian salmonid farming industry has also played a significant and important role in improving the quarantine measures used to manage the disease risks posed by the importation of aquatic animals and aquatic animal products.

L for Land Based Farming

Farming entirely on land has many drawbacks in terms of the availability of resources, sustainability and questions around eating and flesh quality attributes if taken all the way to harvest.

In addition, in the event that 100 per cent land-based farming became viable, it would make sense to establish these facilities closer to market areas on the mainland. As a proud and fiercely Tasmanian company, we want to avoid moving our assets and employees to the mainland. While we have no intentions to move our operations, Whale Point allows us to continue to gain experience in this new technology which will positively shape the way we farm in the future.

While there is significant interest and venture capital investment in onshore salmon farming overseas that is only possible because of less stringent environmental and fish welfare regulations. In addition, funding provided overseas has been predicated on an unrealistic price per kilogram. The reality is that currently only 10,000 tonnes of fish are being grown fully on land globally (approx. 16 per cent of the total current Tasmanian production).

The current situation is that no large scale grow-out to harvest facilities of any commercial scale are yet fully operating--some are under construction, while others are yet to be proven by growing out a full year-class of fish. Rabobank reports that internationally only three applications for land based RAS farming systems (out of 50) have been supported by them for investment for the reasons outlined here.

The commercial reality is that if and when that technology is fully commercially realised onshore facilities will be built next door to the customer base to lower other overheads such as freight etc. So rather than salmon being grown in Tasmania and creating jobs and opportunity they will be grown in Sydney, China or Asia.

At Huon we believe a balance of growing our salmon on land and at sea will allow us to stay sustainable in Tasmania and employ more people locally.

Current drawbacks to farming entirely on land include:

Stocking Density

A pillar of the RSPCA Approved Farming Scheme is to provide conditions where animals can be free to move and express their natural behaviours.

For on land farming to be commercially viable, the salmon would need to be held at high stocking densities to be economically viable. This would be up to 15 times higher than our current maximum sea pen stocking levels (which is 99 per cent water to 1 per cent fish) and could have implications for their health and wellbeing. Due to higher stocking densities, salmon would be unable to exhibit natural behaviours which is contrary to the philosophy that guides our farming.

Fresh Water vs. Salt Water

Salmon have evolved to migrate from freshwater to seawater and as a result, we mimic this in our farming operations. Experience tells us that fish that are grown to harvest in seawater gives an excellent product, and it is not yet fully understood how growing salmon entirely in freshwater will impact both this, and their health and welfare at a larger size.

Theoretically, salmon can be grown on land in saltwater, however, this raises an issue of how to dispose of waste collected within the facility. Current Tasmanian environmental legislation does not permit the disposal of saltwater waste on land, nor can the waste be recycled for fertiliser or compost due to its very high salt content. In addition, the disposal of waste produced by on land salmon farming into the ocean is not permitted in Tasmania.

Electricity

As the water within land-based facilities needs to be constantly moving to provide an optimal environment, along with the production of oxygen, a key resource needed for land-based farming is power and running costs are high. Putting aside all the drawbacks, if Huon were to hypothetically farm the equivalent volume of fish on land as we currently have at sea, we would require 40+ Whale Point equivalent facilities and we aren't sure there is enough electricity produced in Tasmania to power these facilities.

Additionally, in a land-based salmon farm, any electrical outages can result in the stock loss of an entire production cycle. The peak biomass that can be held at our Whale Point nursery is the same as one 240m pen. There is a very big difference in capital cost of both facilities, the energy used during construction and ongoing operational costs. We believe that future salmon production methods should be seeking to reduce environmental impacts, not increase them.

Tasmania is the ONLY salmon farming area in the world where discharge of waste water back into the environment is NOT allowed. That fact alone means that full harvest grow-out capacity may never be commercially achievable in Tasmania.

Salmon Health

As mentioned, there are a lot of unknowns around the implications of growing salmon to harvest size solely in freshwater. What is known, is that land-based farming is riskier as the fish get larger towards harvest size.

See L for Land Based Farming (which includes links to overseas onshore facilities), N for Nursery and W for Waste Management to read about the southern hemisphere's first salmon nursery, built here in Southern Tasmania by Huon Aquaculture.

The Committee may also be interested to read the Appendix 10 Fact Sheet – Land Based Farming which provides examples of overseas companies who are attempting to farm commercially on land. In addition, the article below outlines the "graveyard" of land based aquaculture companies.

https://www.intrafish.com/finance/analysis-heres-a-list-of-high-profile-land-based-aquaculture-failures/2-1-712748

L for Language

The use of specific words is integral to the reputational opportunity of any industry. The subtle use of a few particular words can make such a significant difference to community perceptions. Many of the Committee would have heard the terminology "high conservation forest" rolled out in during the terribly divisive forest wars. While many understood what these words were describing the majority of the community did not - it was clever ploy to engender uninformed support by those that didn't fully understand sustainable forest practices and helped change perceptions deliberately generating more community angst.

This approach has now been successfully utilised again in our industry. The word "industrial" is now the common phrase used by detractors, and now the media, whenever salmon farming is mentioned across all media platforms. Once again the perception is negative but once again the reality is far from the perception, as outlined in this submission.

We hope that the panel in its determination makes comment to the use of language. If we are to have a balanced, respectful and appropriate approach to the development of any industry then the weaponising of words needs to be considered.

Attributing the word "industrial" is a nonsense. Firstly, the stocking density of our salmon are no more than 1% of the total volume of the space available to them. Fish in their natural habitat school so the fact they school within a pen is a natural behaviour. They have the ability to school wherever they chose within that 99% of clean sea water.

Why would we intentionally foul the very environment where we are farming given we want to continue to successful and profitably grow a premium product?

The reality is that in the South East if all the fish were harvested, all the pens removed and recycled, all the moorings from every lease in the industry removed from the seafloor, within a maximum period of 18 months there would be no sign an industry ever existed. What man-made construction or industry including terrestrial farming could ever make that claim?

L for Literacy and Numeracy Support

We also provide support to our workforce seeking to improve their literacy and numeracy which is why **Huon has been a strong supporter of the State Government's 26TEN Program**.

In 2014, a Productivity Commission report found that just one "level" increase in workforce LLN skills had significant effects on employment outcomes, productivity and economic gains both for the individuals involved and the business. The report went on to conclude that LLN skills enhancement underpins human capital and workforce development success.

The seafood industry is rapidly expanding and external influences such as environmental factors, social responsibility, technology, innovation highlight the critical importance to upskill the current and future workforce. 26TEN Tasmania state that 48 per cent of Tasmanians do not have the literacy and numeracy skills they need for life in a technology rich world which further highlights the requirement to act now and plan for the future.

In 2018, Huon was successful in obtaining a grant from 26TEN which has helped transform a number of employee's lives. Employees are now approaching work tasks with confidence and are embracing technology and changes as their work changes. The reach of the program has been significant and throughout 2019/2020 this will continue to be further developed by the introduction of a LLN Training program specifically for the Human Resources, Safety, Learning and Development and Payroll teams.

The group of employees engaged in the program complete training both during work time and after work as they see the value of their development. From a digital literacy perspective, the team is often engaged to help employees in navigating an iPad to complete work tasks or logging into the payroll system to check their payslip to name a couple of examples.

In addition to this critical support Huon is developing a sustainable LLN workforce development framework. An element of this framework is the introduction of an LLN policy which creates a support structure to assist with evaluating key human resource business processes such as recruitment, induction, and position descriptions for their LLN requirements and performance. An outcome of the LLN workforce development framework includes the creation of tools for assessing employees during their induction period, training HR staff to assess and refer people with LLN needs and to help develop an organisational benchmarking tool. Once the framework has been developed and the associated training program the content will be shared with 26TEN directly for other Tasmanian businesses.

Another small way that Huon is sharing its learnings and resources with the wider community because our community is an important component of our success.

M for Macquarie Harbour

While growing conditions in Macquarie Harbour (MH) are conducive to low-cost salmon production the environment is well known to be complex and unpredictable. This means that there must be well controlled and scientifically based production limits if salmonid farming in the Harbour is to be sustainable.

Huon has always maintained a strong commitment to sustainable production in the Harbour as evidenced by a plethora of information available on the public record and the unprecedented action of taking both Federal and State governments to court on this issue.

As early as February 2014, the Tasmanian Salmonid Growers Association (TSGA) established the MH Dissolved Oxygen Working Group in response to concerns over an already evident significant declining trend in dissolved oxygen levels in the Harbour

Despite the mounting scientific evidence, maximum permissible biomass limits were increased by the regulator peaking at 20,020 tonnes. However, in response to severe deterioration of seabed conditions, marked decline in dissolved oxygen (DO) levels, mass mortality events associated with environmental conditions, and impacts on the World Heritage Area, the regulator subsequently decreased the maximum permissible biomass limit over several decisions back down to 9,500 tonnes.

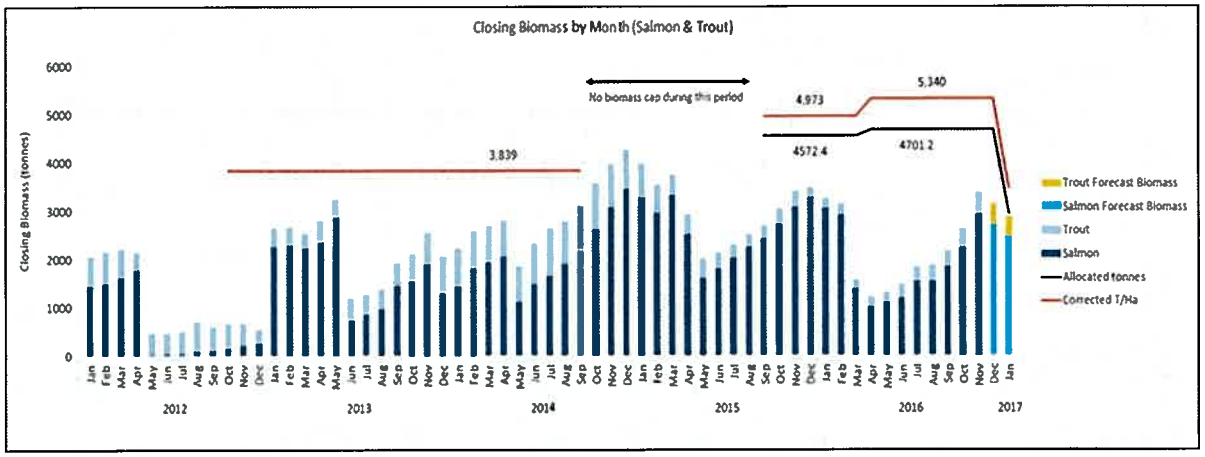
The executive summary of a Report released by IMAS and CSIRO in July 2019 identifies an apparent stabilisation of environmental conditions within the Harbour, however also cautions that oxygen levels in the middle and bottom waters of the harbour are still lower than observed historically and have the potential to return to very low levels in spring 2019.

Over recent months (i.e. spring 2019), Huon's monitoring has shown that DO levels in the water column from 20 metres to 45 metres deep have been consistently below 20 per cent saturation with some depths being below 10 per cent saturation and certain depths being at or around 0 per cent saturation.

The low water exchange characteristics of the Harbour also have particular relevance to fish health and biosecurity. This must also be an important consideration in determining biomass limits.

Given all the available science, Huon is very pleased to see that the EPA's current biomass limit is back down to 9,500 tonnes and that DO levels hopefully have at least stabilised.

Consistent with Huon's strong commitment to sustainable production in MH, Huon always maintained a farmed biomass significantly below that allowed by the regulator's biomass determinations despite having the capacity to farm more fish (see chart below).



However, it is also clear from researcher (i.e. IMAS and CSIRO) and industry data that environmental conditions are still a long way off recovering to pre-farming conditions.

It is extremely clear from the experience over recent years that the environment in the Harbour has the potential to severely deteriorate and crash at production biomasses of around 14,000 tonnes so this should never be considered as a sustainable limit in future decisions. Biomass limits should not be designed to squeeze every last tonne of production out of any farming area including Macquarie Harbour. Huon is of the firm view the maximum permissible biomass limit should remain at 9,500 tonnes for a sustained period until environmental conditions have be shown to have fully recovered and that the recovery is sustained.

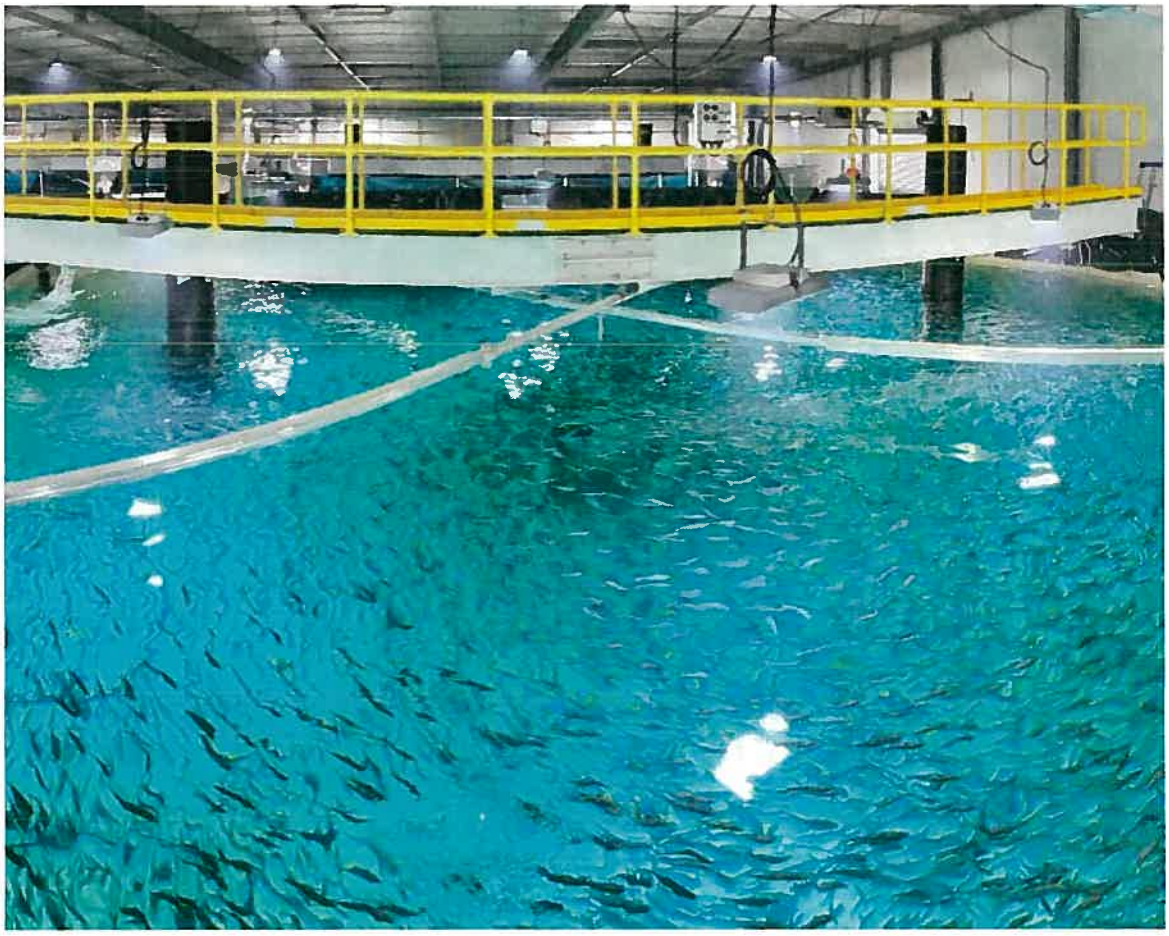
It is critical that we learn the lessons from the last few years. This is not only for the sake of sustainable production in Macquarie Harbour but also for the reputation of both the industry and regulator so that public confidence can be rebuilt.

In closing it is important to understand that while Macquarie Harbour has had environmental issues due to its very unusual and unique hydrodynamics, it cannot be compared to areas such as Storm Bay which has completely different and high energy hydrodynamics. Also see Appendix 12 (Fact Sheet – Macquarie Harbour)

N for Nursery

In another first for Huon, earlier this year our Whale Point salmon nursery released the largest hatchery-grown salmon in the southern hemisphere to sea. The salmon were in excess of 1kg, matching the size of the small proportion of salmon grown on land by the world's leading salmon companies based in Norway and the Faroe Islands.

This facility is the first one in the southern hemisphere to grow salmon to such a large size on land before they go to sea. In the past, farmers have grown salmon to 100-150grams which then takes 14 to 15 months to grow them to harvest size. The reduction in time spent at sea is between 30-40 per cent meaning that salmon can be grown to harvest size in less than a year.



Whale Point uses world-leading water recirculation technology that cleans and re-uses 98 to 99 per cent of the freshwater in which the fish are grown. This enables the water to be reused repeatedly with the remaining one to two per cent going to waste treatment.

The nursery has zero discharge to the environment due to the collection and composting of the fish nutrients for use by local terrestrial farmers.

Also see W for Waste Management for further information about Whale Point's world leading waste management system.

Also see Appendix 19 Fact Sheet - Whale Point Salmon Nursery.

N for Norfolk Bay

In 2018, Huon was granted a permit to undertake temporary salmon harvesting in Norfolk Bay in one of our three existing marine farm leases.

The temporary harvest activity was undertaken as a precaution to prevent possible transmission of Pilchard Orthomyxovirus (POMV) from harvest fish from one farming area to another.

As farmers, we have a responsibility to ensure the highest biosecurity standards are developed and maintained which was the reason for the temporary harvest permit application. This action was undertaken to break the cycle of POMV from infecting our next year-class of fish and those of other companies. Other alternatives were considered such as harvesting fish in-situ in Storm Bay but due to the high-energy nature of the site, it posed a safety risk for our employees, and so short-term harvesting at Norfolk Bay was the best option to safeguard the biosecurity of our industry and protect our staff.

Huon continued to test our fish in Storm Bay throughout the period of harvest in Norfolk Bay. While these fish did have positive PCR results earlier in the year, extensive testing of populations later in the year resulted in negative results. Therefore, by the time harvesting occurred in Norfolk Bay the POMV infection had been resolved. In fact, because of this Huon was able to harvest the last of the Storm Bay fish at its Hideaway Bay lease as normal which meant that harvesting was able to be stopped in Norfolk Bay earlier than anticipated.

To correct misinformation about our proposal and POMV, detailed information was released to the community, and published on our website. https://www.huonaqua.com.au/huons-proposal-temporarily-harvest-salmon-norfolk-bay/.

In 2019, Huon along with other salmon companies have vaccinated many of the 2019-year class smolt with prototype POMV vaccines developed by the Centre of Excellence for Aquatic Animal Health and Vaccines in Launceston. It is expected that all 2020 smolt will be vaccinated with the most up to date prototype POMV vaccine.

In response to this permit and harvest activity, there was strong community concern including a boating flotilla. Once the harvest was completed, all farming equipment was removed from site and retuned to Huon's other farm, as stipulated and agreed in the initial permit.

Huon went on the public record to confirm that the temporary operations undertaken in Norfolk Bay were not, and will never be, a stepping stone to farming in the area.

O for Offshore

Huon Aquaculture pioneered offshore farming in Tasmania. A significant amount of research, undertaken over many years, has been undertaken to inform our operations in Storm Bay, one of the roughest aquaculture farming areas in the world.

We **have been successfully farming in Storm Bay since 2014** and this experience, while challenging at times, has allowed us to better develop our farming equipment and practices. At present, Huon is the only company in Tasmania farming salmon offshore.

Prior to commencing farming in Storm Bay we had closed down our shallowest inshore sites in the Huon River, to reduce our impact on neighbours and improve navigation and safety while reducing our environmental impact.

Offshore farming for Huon means that the location must meet certain environmental conditions and that the equipment and farming practices enable farming to be undertaken safely. To be considered an offshore site it must have the right combination of good water flow and wave action (high energy) and coarse sand sediment on the seafloor. A coarse sand seabed is ideal for sustainable salmon farming. The coarser, more mobile sediment under the pens is better oxygenated which means that any nutrient load (organic matter) is broken down more quickly.

The mix of high energy and inorganic coarse sand sediment is only typically found in exposed sites and they are the two factors that we combine to consider an offshore farming site. It's not necessarily about distance from the shore, but rather having the right criteria such as wind, waves, current and suitable sediment type. Overall, this means that offshore sites have less impact on the environment than an inshore site for the same farming activity.

Also see S for Storm Bay, F for Fortress Pens and W for Wellboats – all important components of our successful offshore farming.

P for Packaging

At Huon we want to deliver fresh product to the market in a safe, secure, and presentable manner. As the majority of our packaging is in direct contact with fish, which is a high-risk food product, it makes it more challenging to incorporate recyclable material in all cases. This means that we must **focus on incorporating recyclable packaging wherever possible**, and keep a close eye on emerging products that may replace items which are currently non-recyclable.

Huon have been signatories of the Australian Packaging Covenant (APC) since 2011 which sets out standards and targets for industry. Since that date, Huon continues to better our targets. For example, we have reduced the amount of non-recyclable plastic by 15 per cent in our retail cold smoked products; as we made the plastic pouch thinner, we added a cardboard sleeve. The sleeve protects the pouch, which serves the purpose of safely delivering our product to market, reducing damage which also reduces food waste.

Our Modified Atmosphere Packaging (MAP) trays (used for our fresh and hot-smoked portions) comprise of a combination of polyethylene (PET) recycle code '1', and polypropylene (PP) recycle code '5'—the trays are marked with the recycle code on the base.

Huon is critically aware of the **environmental impact of packaging, and we undertake Sustainable Packaging Guideline (SPG) assessments** annually for all product packaging.

Huon **embraces the use of recycled materials in our secondary packaging (e.g. cardboard)**, which also serves the purpose of delivering our product safely to the market. In addition, we continually work with our packaging suppliers and the APC to ensure that we are ready to implement innovative, eco-friendly packaging as they arise.

See Appendix 17 for additional information on Huon's efforts to use more sustainable packaging.

P for People

Huon has long held the view that our people are our most important asset; which is why we invest a significant amount of resources, time and money into supporting our employees, making their workplace the safest it can be and providing additional training and workforce development programs.

We constantly review and improve our safety systems, programs and processes. This includes an ongoing focus on the development and implementation of structured health and safety programs. These are aimed at not only reducing our risks but also improving the wellbeing of our workforce and supporting the ability of our people and leaders to manage safety effectively.

A key part of this is ensuring that the Consultation, Cooperation and Coordination Framework continues to support the expansion of activities across the group. Overall safety performance continued to improve, particularly the ALTR which fell from 14 hours lost per employee the previous year to 10 hours.

Huon has maintained a commitment to developing its workforce and building capability. The People & Capability strategy continues to be rolled out, including the successful Huon Leaders program which has supported 42 participants in activities designed to strengthen their leadership capacity. The program has also laid the groundwork for a future program that will harness the skill sets of Huon's Emerging Leaders in FY2020. We currently have (October 2019) 111 employees undertaking traineeships in areas including aquaculture, engineering fabrication, seafood processing, and warehouse operations. This figure is a record number and it reflects our dedication to the development and retention of our workforce.

Recently, a new, whole of business Innovation Program has been introduced to foster the development of innovation as a core skillset. This will build on the culture of innovation and employee idea generation that is a part of Huon's DNA.

Several teams across the company have also undertaken plain English workshops for culturally and linguistically diverse (CALD) staff. This initiative allows staff to better communicate with each other, improving workplace safety and bridging language barriers. This also assists CALD staff to confidently form meaningful connections with people in the workplace and in their communities.

This company, and indeed the salmon industry, employs incredibly clever people. Huon staff hold a diverse range of qualifications from PhD's to Diplomas and Certificates, in Marine & Antarctic Studies,

to Business, to Engineering and Hyperbaric Operations. Check out the video enclosed with this submission to meet just two of Huon's "doctors" (Adam Smark and Shea Cameron).

Huon **was the first in the industry and one of the first in the state to implement a Drug and Alcohol Policy** for its entire workforce including all management up to CEO level. This policy allows all Huon employees and contractors to be subject to random, unannounced, testing.

The key reason for the implementation was twofold. Firstly, the safety of our staff is paramount. Our industry is high risk and every effort is made to ensure that staff can undertake their duties safely in whatever environment they work in. The second reason was that in researching such a policy it was apparent that particularly in regional areas of the nation and in Tasmania drug and alcohol abuse is a significant social problem. After many years, not only have positive results continued to decline (despite increased testing) but just as importantly family and community effects also show the same positive results. In the event that a positive test result is returned, employees have access to a rehabilitation program.

The growing problem of mental health is another area that Huon has applied a long, caring and proactive approach. Regional Tasmania has significant mental health problems and as such so do our workforce. For more than 15 years, Huon has provided a free mental health counselling service (available outside work, and for family members).

In 2014, we received Suicide Prevention Australia's Best Practice Business & Enterprise Award and then in 2018, we won Suicide Prevention Australia's LiFE Award for our suicide prevention support. These awards take pride of place of place in our boardroom as a reminder of the importance and value of this work.

In relation to our workforce, it was disappointing to read the submission to the Committee from South East Marine Protection in which they claim "*We believe there are false claims of employment numbers*" (due to automation)–also posted on Facebook 19 November 2019 @ 10:55pm.

They go on to further claim "*There are a number of people on immigrant visas working for the companies, as opposed to an increased number of local workers. There needs to be transparency about employment figures*" and that "*Leasing of well boats–comes with crew e.g. Norwegian boats*".

Another accusation based on zero evidence.

In relation to Huon's employments numbers, every quarter the payroll numbers are automatically loaded to the Dashboard. Our workforce (November 2019) is 720 people–three years ago, at the same time, the workforce was 513 so **the implementation of automation in this company has seen a 40 per cent increase in the workforce!** Check out our Sustainability Dashboard for additional details about our outstanding workforce.

In relation to SEMP's other baseless concern, the wellboats are leased to Huon for a period of 10-years from Solvtrans, a Norwegian company. Ship's Masters are employed directly by Solvtrans as part of the commercial contract arrangements, and if the country of birth is of primary importance to SEMP, they will be pleased to know that 50 per cent of the current wellboat's Ship's Masters are Australian. Huon employs all the remaining wellboat crew and at the moment from the current crew of 14, 12 are Australian citizens. All crew positions for the new wellboat, the *Ronja Storm* are filled by Tasmanians (all of whom are Australian citizens).

Huon is a proud employer of Tasmanians and the inference that we are doing anything other than building local knowledge and expertise, and supporting the next generation of local employment, is false.

R for Research & Development

Huon is extremely proud of the advances made in the last 30 years of salmonid farming in Tasmania. Research into all aspects of our operations is a cornerstone of our business and it is through ongoing investment that we remain at the forefront of our industry internationally.

Huon has invested in the order of $200m on research and development (R&D) since 2012 alone and collaborated with over 17 external research providers. Our expenditure on research and development is published at https://dashboard.huonaqua.com.au/company/research

Huon also undertakes a large number of internal R&D projects providing results that underpin scientifically based decision-making which enables Huon to remain at the leading edge of salmonid farming expertise and technology.

Huon operates a dedicated thirty-five trial pen unit at its Hideaway Bay lease near Dover (one of a few commercial trial units worldwide) and also operates three dedicated trial units (a total of 51 tanks variously capable of holding 0.2 gram to 15 kg size fish) located at its freshwater hatchery operations.

Huon is a one-third partner in the Experimental Aquaculture Facility (EAF), a world class research facility which opened in October 2015. A first of its kind in the Southern Hemisphere, the primary purpose of the EAF is to provide specialist research facilities to support the growth and sustainability of the salmonid industry. Tasmania's salmon farming is by far the largest aquaculture industry in Australia, and accounts for the bulk of seafood production in Tasmania.

The EAF is advancing the understanding of Tasmania's aquaculture industry (mainly salmon and oysters) by addressing issues of animal physiology, genetics, health, nutrition, welfare and production, environmental management, food safety and climate change impacts.

The EAF is a key component in the industry's strategic future, providing a research capability that underpins growth, sustainability and the ability to adapt to a changing environment of increasing sea water temperatures. For salmon farmers, this facility is already delivering improved environmental benefits through:

- Furthering research into Amoebic Gill Disease management;
- Reducing the environmental impact of salmonid farming;
- Reducing the fish losses due to high sea water temperatures; and
- Maintaining size of fish during extreme high temperatures.

Huon has been a strong supporter and funding contributor to the Centre of Excellence for Aquatic Animal Health and Vaccines located in Launceston. This facility is critical in providing research and development of vaccines and diagnostic tests for the salmon industry.

See Appendix 4 for Fact Sheet – EAF

See Appendix 14 for Fact Sheet – Research and Development

R for Risk Management

The following may appear to be a repeat of other sections but it is important the Committee is aware that salmon farming is an incredibly complex, highly regulated, risky industry and as such demands constant attention and resources to manage this risk. Once again it is not down to chance that over 30+ years, Huon has not only successfully managed these risks, but become a world leader in how to farm safely, sustainably and with a constant focus on our environmental footprint.

Huon Aquaculture has been farming sustainably for 33 years and, as with any farming endeavour, Huon is subject to a range of events with outcomes that can impact the supply of fish, fish growth and mortality.

The most effective strategy to minimise exposure to such risk is good animal husbandry which requires an ethos of care and innovation throughout the lifecycle of the fish. Preventing disease and the effective management of outbreaks if they do occur, is integral to Huon's farming methods. Critical to minimising the impact of disease is maintaining effective biosecurity. The most important salmon disease in the south-east region of Tasmania is amoebic gill disease (AGD). It is routinely controlled through regular freshwater bathing of affected salmon. Mortality is minimal, but the resources required for bathing are significant.

See F for Fish Health and I for Ingredients for detailed information about Huon's biosecurity and fish health practices.

Many of the factors that give rise to livestock risk are closely tied to the environment in which salmon are grown. Environmental risks are constantly present, including issues such as extreme weather events, high water temperature in summer that can be stressful to salmon, the availability of fresh water for AGD bathing, algae blooms and predators. The most common predator for salmon in Tasmania are seals (and the occasional cormorant eating smolt). Occasionally salmon are also at risk from contact with other organisms such as moon jellyfish.

See A for Algae, C for Climate Change, F for Fortress Pens, J for Jellyfish, N for Nursery, O for Offshore, W for Water and Wildlife Interactions for additional information about how Huon manages its environmental risks.

The key economic risks in salmon farming relate to the ability to maintain both supply of its product and also consumer confidence in its quality and safety. Without access to regular supply of the right type of feed, production would be compromised which is why Huon mitigates this risk by maintaining multiple sources of feed supply. The sale of our product is dependent on market perceptions of its quality and safety which is why we invest in quality assurance systems and testing to ensure safe, quality products. Likewise, diversification of channel mix is important to reduce risk which is why Huon sells through the wholesale market, into the retail sector both domestic and offshore via contracted sales, and through the export channel.

Providing a workplace that is safe and ensuring that staff return home un-injured each day is a fundamental duty of an employer. It is also essential for attracting and retaining staff as well as providing an environment which supports learning, team work and innovation. Our equipment and work processes reduce risk–our Fortress Pens are designed to protect staff from interactions with seals and provide a safe working environment as does extensive use of automation and technology in net cleaning and repair; feeding; and removal of fish mortalities has reduced or eliminated the need for divers. The introduction of unmanned feed barges moored onsite and automated feeding reduces the number of vessel movements and time employees spend on water, particularly at high-energy sites while the introduction of automation and robot packers into the processing stage of salmon production to minimise manual handling.

R for Rocky Reefs

There are various lines of evidence (outlined below) which **demonstrate the effects of fish farming on rocky reefs are in nearly all cases insignificant.**

1) Valentine, J.P., Jensen, M., Ross, D.J., Riley, S., Ibbott, S., Organisation, 2016, Understanding broad scale impacts of salmonid farming on rocky reef communities, Hobart, September, 2016. FRDC Project No 2014/042

   Analysis of data from monitoring sites for the period 1992-2015 **showed no consistent patterns of broad-scale change in macroalgal community structure over time.** While key functional groups and dominant taxa showed some variability, these tended to be fluctuations rather than directional change.

   Abundance of nutrient indicator species was low and variable over the 1992-2015 period and there was no evidence of an increasing trend over time. There were occasional peaks in abundance of nutrient indicator species, but these were not consistent within each region or between years. It is notable that the frequency and magnitude of peaks in abundance of nutrient indicator species were observed at the Maria Island sites which (at the time) were remote from salmonid farming operations (> 50 km).

   One of the few changes identified in the time series analysis was at one of the Tinderbox sites (Central Tinderbox). At Central Tinderbox, there has been a considerable increase in cover of Caulerpa spp. (particularly C. trifaria) since 2004. Prior to 2004, Caulerpa spp. abundance at this site averaged < 10 per cent, before an increasing trend that reached a maximum of 65 per cent in 2007. Since 2007, Caulerpa spp. cover has been maintained at around 40 per cent. Reasons behind this change remain speculative, but there is no documented evidence in the scientific literature to suggest that Caulerpa spp. respond to increases in nutrient levels. One possible explanation relates to changes in sand or sediment deposition at this site, since Caulerpa species tend to flourish on the reef/sand edge.

   A more recent IMAS study in the D'Entrecasteaux and Huon in 2008 demonstrated changes in abundance of nutrient indicator species consistent with salmonid farming impacts. However, comparisons between the 2008 and current study were limited by differences in the timing and spatial distribution of study sites. Rather than the gradient approach used in the IMAS study, the current study was designed to examine broad scale impacts and most sites were located at considerable distance from fish farms. Differences in survey timing also limit meaningful comparisons with the IMAS study. Nutrient indicator and ephemeral species are typically highly seasonal, and more likely to be encountered in the summer months when the IMAS study was undertaken. It is therefore likely that the low abundance of ephemeral and opportunistic algal species observed in the current survey may at least partially be explained by the autumn timing of the 2015 survey.

2) Nutrient enrichment on reefs

   Clarifying the relationship between salmon farm nutrient loads and changes in macroalgal community structure Distribution. MacLeod et al., 2016. FRDC project 2011-042. PhD 1 Determining the effects of nutrient enrichment on rocky reefs communities (observational, experimental and predictive capabilities).

   'Nutrient sources were added to three reef systems to assess the effects of increased nutrient availability on macroalgal community composition. There was no effect on the abundance of canopy forming algae. The effect on the abundance of opportunistic species (e.g. filamentous algae) was not clear. Although opportunistic algae proliferated at one site where nutrients were elevated, this was not the case at the other reef locations. There was little evidence of change in macroalgal abundance, and reef function appeared fundamentally unchanged. Physiological differences were observed in several canopy-forming species that appeared to be in response to nutrient addition, suggesting that this may be a more sensitive early indicator of change than full evaluation of community structure. The physiological response data appears to suggest that the reef system in the upper part of the Channel may be more impacted by nutrients than the other reef systems in the study. Overall, the three reefs assessed in this study responded differently to equivalent nutrient additions (impacts), suggesting that broad-scale susceptibility/

resilience to nutrient inputs is contingent upon the prevailing environmental conditions and that future assessments may need to consider this.'

It is noteworthy that Huon's offshore farms are positioned where flushing rates of both organic matter and nutrients greatly exceed that encountered in the Huon and D'Entrecasteaux Channel. Further the company purposely positioned all leases at least 1 km from any reefs.

Internationally, reefs are not considered to be threatened by well positioned fish farms, and do not attract the same level of monitoring as required here in Tasmania.

R for RSPCA Approved Farmer

Huon was the first, and remains the only, seafood producer/farmer in Australia to meet the RSPCA's detailed animal welfare standards for farmed Atlantic Salmon for inclusion in RSPCA Australia's Approved Farming Scheme.

The journey to inclusion in the Scheme began five years ago with the development of an animal welfare standard for farmed Atlantic salmon by the RSPCA. Huon has always held world's best practice animal welfare at the centre of all its farming activities and our keenness to have this independently verified by a third party led us to be a key instigator in the development of this standard and willing participant in the extensive consultation that resulted in the eventual publication of the standard in March 2017.

Huon, with its connection to the industry in Scotland, could see the opportunity to bring a Salmon Standard to Tasmania. To that end, at Huon's expense, a UK RSPCA key auditor came to Australia for a two-week tour and gap analysis scoping of the differences between the UK standard and one that would need to be developed in Australia. Part of the tour was the initial meeting in Canberra with the RSPCA Australia CEO and Board to discuss the possibility of establishing an Approved Farming Scheme.

The RSPCA Scheme works by:

- Establishing animal welfare standards that go beyond regulatory requirements;
- Enabling differentiation and marketing of products from RSPCA Approved farms; and
- Offering consumers a higher animal welfare alternative.

The *RSPCA Approved Farming Scheme Standard – Farmed Atlantic Salmon* outlines production practices for the freshwater and marine stages of Atlantic salmon farming. The Standards aim to meet the fish's behavioural and physiological needs and are designed to assist the industry to continually improve and demonstrate good animal welfare outcomes. The Standards take into consideration RSPCA Australia policy, available scientific research, current legislation applied in Australia, veterinary, technical and producer advice, and current industry good practice.

Since that time all our southern sites and every one of our farming practices, from freshwater hatcheries to marine grow-out, have been continuously assessed by RSPCA Approved Farming Scheme Assessors on almost a monthly basis with full certification and inclusion in the Approved Faring Scheme achieved in June 2018.

This has resulted in continuous improvements to our water quality monitoring, fish handling, predator management and harvest processes, including the development of a humane harvesting system that received the UK RSPCA award for welfare and humane harvesting of salmon and is now recognised and used as the gold standard around the world.

RSPCA commentary on Huon's inclusion in the Scheme is contained here: https://www.youtube.com/watch?time_continue=18&v=Dm6KEAH2YcU&feature=emb_title

Our connection with RSPCA also goes beyond Australia; in 2014, our harvest system (designed in-house by two employees) received the RSPCA UK award for welfare and humane harvesting of salmon; the stun and bleed harvest system is now recognised and used as the gold standard around the world.

Prior to engaging with RSPCA, Huon had already adopted virtually all of the international RSPCA welfare standards as it had been proven to us by our international networks to be both a humane and efficient manner in which to farm. The final certification, once achieved, was yet again a proud Huon first for the Tasmanian industry.

R for Residue (Chemical and Contaminants)

We are often (once again, wrongly) on the receiving end of claims that salmon is full of chemical and environmental contaminants. If that were so, why would we submit our salmon and trout for routine testing by the Federal Government?

Since we began reporting to the National Residue Survey in 2000 **there have been no detections of any additives, anthelmintics, contaminants, hormones or insecticides in Huon Aquaculture products**. The most recent survey results (2019) demonstrate that the presence of heavy metals in our fish is exceedingly low. Lead and mercury have a mandated limit of 0.5 to 1 mg/kg. Huon fish came in at 0.01mg/kg; some 50 to 100 times lower than the mandated level.

Check out the website https://www.agriculture.gov.au/ag-farm-food/food/nrs.

We also publish the survey results on our website https://www.huonaqua.com.au/flesh-testing-results/.

In addition, we are part of an independently-run programme to quality assure our fish for entry to the European Union and other overseas markets which includes testing for various substances.

Our feed suppliers also adhere to the same testing regime, with results published on the respective websites. Results over the past decade show that feed fed to our fish meets all Australian requirements and that levels of undesirable substances are substantially below the limits set by authorities.

(https://www.skretting.com/en-au/, https://www.biomar.com/, https://www.ridley.com.au/)

It is a fact that our recirculation hatcheries are all based on "biological" filtration systems. Effectively that means that if we use chemicals in those hatcheries we ruin the mechanism that cleans the water (much the same as what happens to human gut flora after a course of antibiotics) which would be an incredibly ineffective way to operate. Just to reiterate, we never use antibiotics in our RAC hatcheries.

At this point it is also important to consider the way in which our water and sewerage utilities manage waste water. In April 2019, the Tasmanian Government released the Tasmanian Water and Sewerage State of the Industry Report 2017-18. The report disclosed that sewage treatment plants in Tasmania discharge treated water to inland, estuarine and marine (coastal) environments. Of the total volume of effluent discharged to waterways, most was discharged to estuarine waters (26,329 ML or 52.0 per cent), followed by discharge to coastal waters (12,998 ML or 25.7 per cent) and inland waters (5,870 ML or 11.6 per cent), 5,418 ML (or 10.7 per cent) of effluent was re-used.

STP effluent is essentially treated sewage that has been deemed 'clean' enough to enter our environment. While effluent water is essentially EPA approved, there are restrictions on the volume of effluent water that can enter waterways. During the 2017-18 period, TasWater failed to achieve full compliance with the regulatory discharge limits in relation to all except one Level 2 STP under its control.

In other words, TasWater is releasing non-compliant levels effluent water into our waterways.

This non-compliance has been documented for some years, with the regulator providing this statement in their 2011-2012 Tasmanian Water and Sewerage State of the Industry Report: "*The environmental impact of wastewater on the State's rivers and coastal waters continues to be of concern, with effluent containing significant organic loads, elevated nutrients and faecal bacteria concentrations discharged to the environment. The Tasmanian corporations are still lagging behind their mainland counterparts in relation to compliance of treated effluent against regulated discharge limits*," (2011-12).

To kill the bad bacteria associated with sewage waste, effluent water contains chlorine (and in some cases, sodium hypochlorite). However, micropollutants such as pharmaceuticals, ingredients of household chemicals, chemicals used in small businesses or industries, environmental persistent pharmaceutical pollutant (EPPP) or pesticides may not be eliminated in conventional treatment processes, and therefore enter Tasmanian waterways.

The human use of pharmaceuticals and personal care products is projected to increase with growing human populations, causing contamination of aquatic ecosystems and food chains.

S for Seagrass Beds

Despite the baseless claims from some parts of the community, **seagrass beds are present and increasing in extent around some of our leases in the Dover/D'Entrecasteaux Channel** area where we have farmed for over 30 years.

The beds are an important habitat for many species and the presence of seagrass beds is linked to a variety of environmental conditions including water temperature, flow and nutrient levels, but also naturally waxes and wanes in response to changing environmental conditions. Seagrass beds can be easily damaged by anchors of vessels which is why our mooring system is installed only after a baseline survey plus our service vessels moor directly to pens (not to the seafloor).

As part of our ongoing environmental monitoring program, we regularly survey and monitor seagrass beds around our farms with data provided to EPA, IMAS and other research institutions.

See Appendix 15 for additional details about seagrass and the monitoring regimes undertaken by the salmon industry.

S for Storm Bay

Huon is often accused of a lack of community engagement on many issues, with particular and sustained complaints regarding the expansion of farming in Storm Bay.

Another false accusation.

Huon undertook a range of stakeholder consultation and community engagements over many years to inform the preparation of the East of Yellow Bluff (EoYB) Environmental Impact Statement (EIS). Consultation and engagement was undertaken in the context of the company's wider changes to farming, including the use of new technology (such as the wellboat and fortress pens) and farming methods that the company's growth is largely predicated on.

The stakeholder engagement program provided opportunities to participate in a range of consultative activities in relation to the proposed amendment to secure a suitable lease site to introduce smolt into the sea in close proximity to Huon's first genuine 'offshore' or 'exposed' fish farm sites in Storm Bay.

An important feature of consultation was the company's willingness to actively respond to the concerns of stakeholders. This is evidenced by the re-siting of the proposed new zone further offshore (Trumpeter Bay off Storm Bay lease area to new zone east of Yellow Bluff) in direct response to feedback from regulators (MAST and TasPorts), commercial and recreational boating and fishing industry feedback.

Since the preparation of the EIS, Huon also responded to concerns from local residents in relation to visual impacts and subsequently made a further modification to the proposed lease site.

Despite the view of some, these are regulated by the State Government under Marine Farming Licences in addition to significant environmental monitoring compliance with is regulated by EPA Environmental Licences for each site.

Again, despite the view of some, significant environmental monitoring is undertaken in the area includes water column nutrients, seabed conditions, water temperature and salinity, dissolved oxygen, ambient phytoplankton and zooplankton, net fouling and marine debris.

Environmental monitoring in Storm Bay has shown that nutrients are undetectable above background levels at distances greater than 500 metres from fish farm pens. The nutrients are either diluted by the strong waterflows through the farms and/or are relatively rapidly absorbed by the system in general (e.g., phytoplankton). A practical comparison is that Storm Bay is like a continuously flushing toilet.

In fact, Huon has reported to the EPA through the Broadscale Environmental Monitoring Program since 2009.

This government framework is a localised lease-specific monitoring program developed by the EPA in consultation with IMAS and CSIRO) to monitor key environmental indicators within and adjacent to marine farming lease areas and throughout Storm Bay. This program involves proposal-specific monitoring of water quality and sediment condition geared to production cycles and ongoing broadscale monitoring to assess water quality, sediment condition and reef community structure at intermediate and far-field scales.

A suite of approved FRDC research (from CSIRO and IMAS) is currently underway to continuously inform the expansion in Storm Bay. The research suite includes:

- Hydrodynamic and biogeochemical modelling and monitoring (led by CSIRO)
- Decision support tools (led by CSIRO)
- Observational and monitoring program design, implementation and evaluation (led by IMAS).

In addition to the suite of three projects above there is a large Governance Project–FRDC Project 2018-103 all of which will contribute to scientifically robust information and predictive tools.

Also see Appendix 16 for additional information on our farming in Storm Bay.

S for Strategy

It is not by chance that Huon has future production capacity largely through from offshore farms. Having invested $400m in capital, infrastructure and equipment improvements over the past five years, Huon is in a position to harness the market potential.

Over its 30+ year history Huon has always grown in line with demand. This long term strategy has seen the business significantly invest in freshwater, marine operations and processing functions as part of our Controlled Growth Strategy (CGS). The CGS has now been fully implemented (final component is the arrival of the second wellboat in January 2020 and seventh and final feed barge) and will deliver higher production volumes while increasing fish quality, maintaining consistency as well as improving efficiencies to drive higher margins. The CGS has been guided by six principles:

- Increasing production to meet growing customer demand responsibly and safely while also increasing efficiency of farming practices and improving the already high quality of Huon fish;
- Improving the health and welfare of fish;

- Improving safety for Huon workers;
- Reducing the company's environmental footprint;
- Continuing to positively participate in the community; and
- Producing world-class salmon products in Tasmania.

During the five-year implementation phase of the CGS, Huon focused on re-engineering every step in the production processes to enable us to operate in high-energy sites offshore. We also ensured our systems, technology and infrastructure were world class, innovative and designed to build additional layers of efficiency and resilience into our business.

Tangible outcomes include the construction of Forest Home hatchery and Whale Point salmon nursery, complete replacement of all fish pens and moorings, construction of new, larger feed barges, expansion and improvements to processing facility in North West Tasmania, construction and commissioning a new additional valued added processing facility in Sydney as well as investment in the world's biggest wellboat, the *Ronja Storm*.

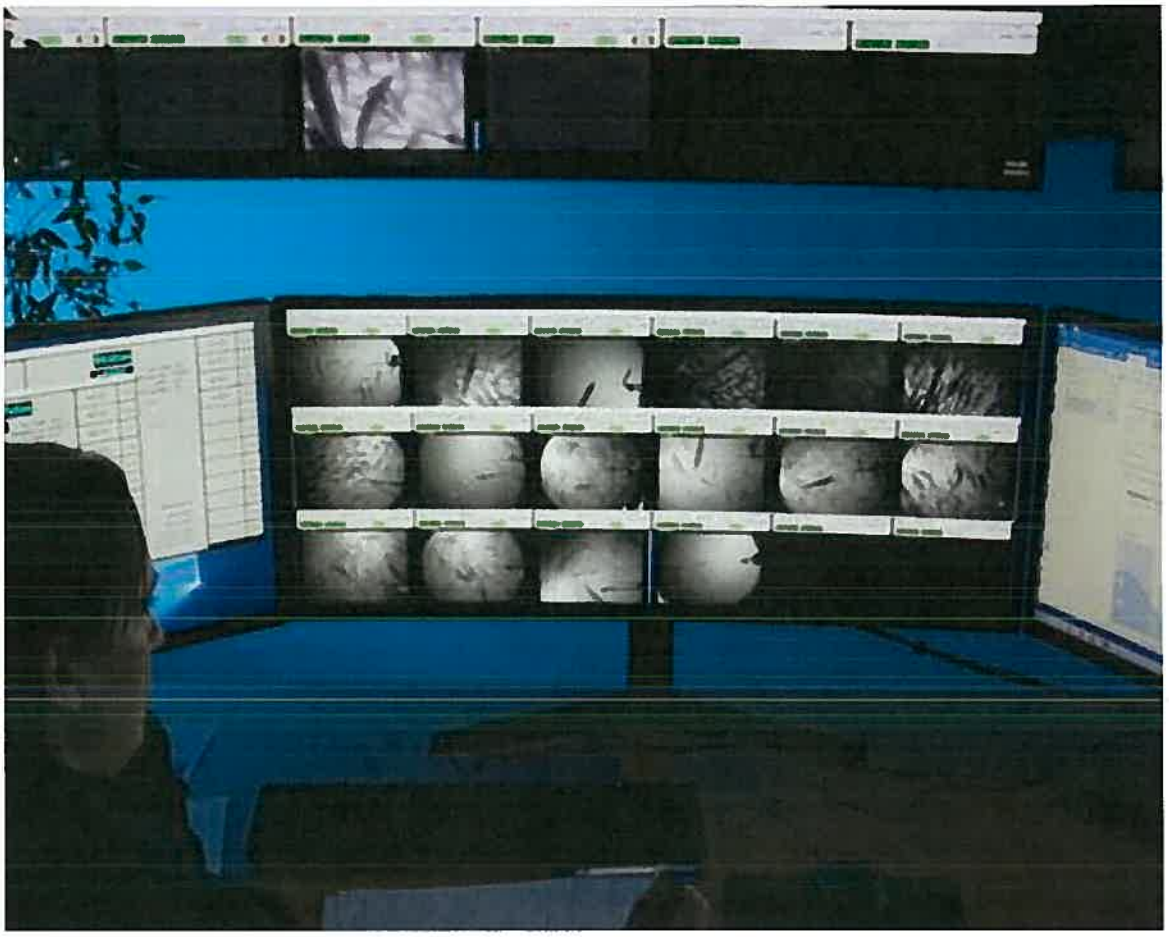
Huon success and ability as farmers has also led them to investment in new leases in both NSW and WA, working closely with both state governments to undertaken commercial trials to grow Yellow Tail Kingfish.

Huon is well placed to help develop these new aquaculture opportunities utilising the technologies developed here in Tasmania and underpinned by the strong talented team of professionals currently employed within the company.

T for Technology

Our remote feed system uses a combination of industrial automation and artificial intelligence (AI) to autonomously control feed rates in offshore fish farms by identifying and tracking feed pellets in the water column using machine vision and machine learning.

This system means that at any one time, just four people are remotely feeding (from Hobart) every one of our fish regardless of location (Huon River, Storm Bay or Macquarie Harbour), which also creates a safer working environment particularly when the weather is too rough to operate from a feed barge. Through the control room, the feed system remotely switches on and off feed to particular pens, and monitors feeding using a series of underwater cameras and pellet detection software. By carefully monitoring how much the fish are eating, we are able to prevent feed wastage and reduce our environmental impact.



The feed system recently took out state and national iAwards; just one of three Tasmanian companies who have won an iAward in its 26-year history.

Also see F for Feed Barges and W for Wellboats for details on the use of world-leading technology across Huon.

U for Underwater

Underwater footage of the seafloor under all our lease sites is published on our website (Dashboard). As part of our regulatory requirements baseline surveys are undertaken on every lease site before stocking can commence, as well as when pens are removed from the lease.

On a daily basis we have ROVs (Remote Operated Vehicle) that operate 24 hours a day, inspecting all the pens and moorings, underwater. Reports are generated and then dive teams assigned to go out and repair and remedy any issues identified.

See E for Environmental Monitoring

V for Vessels

Huon's vessel portfolio comprises of 85 boats working on waters throughout our marine farming areas in Tasmania's south and west coasts. Annual surveys are undertaken to keep our vessels at the best possible standard. To ensure best practice, we have emulated the regulation survey required for Australian Maritime Safety Authority (AMSA) which is required once every five years.

Automatic Identification System (AIS) trackers have been installed on our larger vessels and/or vessels with frequent waterway traffic movement which assist with monitoring our vessel use and routes. These include vessels that are used for mooring, net cleaning, feed delivery, working vessels to change nets, smolt delivery, harvest pickups, staff transport, and bathing.

Noise compliance for all Huon (incl. contract) vessels and marine farm equipment are currently assessed against three regulatory regimes:

- *Environmental and Pollution Control (Miscellaneous Noise) Regulations 2014* for vessel noise at source;
- *Requirements for the Control of Noise Emissions at Marine Farms (2001)* for DPIPWE marine farm requirements; and
- *Environmental Management and Pollution Control Act 1994* for environmental nuisance.

V for Vertically Integrated

Huon is a fully vertically-integrated company, meaning that we do everything from selectively breeding brood stock for egg production, to processing salmon ready for your plate.

The lifecycle of a Huon salmon is two to three years and at each stage, the Company's operations are underpinned by a commitment to the highest level of animal husbandry, environmental management, welfare and quality.

Huon has invested $400m over the past five years to ensure it is able to supply the growing demand for salmon in the years ahead. In order to operate on a larger scale and in areas not previously farmed in Tasmania, Huon has continued to innovate and engineer solutions by leveraging technology to position it at the cutting edge of aquaculture.

W for Water (Freshwater Use)

At Huon, we use freshwater to bathe our fish to treat them for Amoebic Gill Disease (AGD). We do this because it is essential for their health and wellbeing; if AGD is left untreated, it can lead to the slow death of the fish by asphyxiation.

We are conscious of reducing our impact on Tasmania's freshwater supply for this use, which is why we reuse water from our Whale Point nursery and will heavily rely on desalinated water (generated by the *Ronja Storm*) moving forwards. We also source water from the mouth of the Esperance and Kermandie Rivers, which would end up in the sea if not taken. The amount taken has never impacted on residential use, nor has it impacted the natural environmental flow. Huon also sources water from private land dams. This water is not fit for human consumption and if required, is available as a resource for fire-fighting.

Due to the advanced technology at Whale Point, and an on-site dam into which the treated wastewater flows, we are able to reuse this water on board the *Ronja Huon.* As an absolute back up, we do have town water access which has been used in the past to treat severe AGD cases—this is only used a handful of times per year.

Waste water produced at our processing facility at Parramatta Creek in the North West is used to irrigate grazing land for local farmers.

Over the past five years, since the Controlled Growth Strategy was introduced, Huon has reduced its total use of freshwater (annually) by 50 per cent—from 2,204 mega litres in 2014 to 1,100 mega litres (this includes use of Huon-owned dam water and river mouth water) and this is expected to reduce further when the desalination plant on board the Ronja Storm begins operation. In 2019 (January – November), our usage of town-supplied water for bathing (does not include dam or river water use) was ONLY 1.699 megalitres! By comparison, the average household usage in Australia per annum is around one-third a megalitre.

We acknowledge that there is concern around our use of Tasmania's freshwater, and we believe that a combination of water sources, including desalination, demonstrates responsible practice.

W for Wellboat

Wellboats have wells or tanks for the storage and transport of live fish. The term was first used in the 17th century and before modern refrigeration methods, well-boats allowed for the delivery of live fish to port. Contemporary wellboats are used extensively in the aquaculture industry around the world.

Huon was the first company globally to use a wellboat for the purpose of bathing fish in freshwater.

Wellboats are not on-water fish processing factories.

Wellboats eliminate the need for time intensive, noisy towing of pens back and forth through Tasmanian waterways. For example, instead of towing pens at 1-2 knots, fish can be transported at 12-14 knots reducing travel time, visual impact and noise for surrounding communities. Wellboats also provide a much safer working environment for employees, particularly as Huon grows its off-shore farming.

We use our current wellboat, the *Ronja Huon*, to transport smolt to sea, to transfer them from farm sites to harvest pens and to bathe them.

In January 2020, Huon's second wellboat, the *Ronja Storm* will arrive; a highly sophisticated wellboat designed to withstand the world's roughest salmon farming area, Storm Bay, which is why she is named after the challenging waters where she will operate.

The *Ronja Storm* is the largest wellboat in the world, both in terms of ship size and water holding capacity; at 116 metres long and 23 metres wide, she has a total water storage volume (including treatment tanks) of over 13,000 cubic metres and holds 800 tonnes of fish at a time (equivalent to an entire 240m Fortress Pen). She also **contains an on-board desalination plant that produces 700,000 litres of freshwater every hour**, reducing our use of Tasmania's freshwater resource.

While *Ronja Storm* will be able to work in more difficult conditions than *Ronja Huon*, its large capacity and ability to produce freshwater on-board means it can do considerably more work when conditions are fine and easier for farm crews.

The arrival of the *Ronja Storm* will allow the *Ronja Huon* to be used primarily for harvest and as a back-up wellboat. Dedicating the *Ronja Huon* as a harvest transfer vessel allows for better biosecurity as it reduces the need for holding pens. All water used for harvesting will be retained on *Ronja Huon* for disinfection and release, or transport back to the site of origin for release.

Ronja Storm's power generation and propulsion system is designed to operate at a maximum sound pressure of 35 decibels (dB) (noise testing has been undertaken and certified) which is a reduction of 90 per cent when compared to *Ronja Huon's* designed noise pressure of 45dB. To compare this with some common household white goods, the quietest dishwasher available produces 40dB and an average domestic refrigerator produces 45dB.

See Appendix 18 for additional details on the *Ronja Storm* including the on-board desalination facility.

We have maintained regular communication with the Tasmanian community over the past year+ regarding the Ronja Storm via media statements and information posted on our website and social media.

W for (Future) Workforce Development

At Huon, we focus on the development and employment opportunities for Tasmanian students at all levels of education, regardless of their background or career goals.

One of the many benefits of operating in regional areas is the strong connections that can be forged with local schools. At primary school level we tend to engage with students through classroom activities. This gives us an opportunity to explain what we do at Huon as well as the educational pathways they can take if they are interested in following a career in the aquaculture industry.

However, we don't just focus on primary schools, at the other end of the educational spectrum, we work closely with the University of Tasmania (UTAS) to provide guidance and support to their students completing degrees in Marine and Antarctic Science, majoring in Aquaculture or Fisheries Management. In addition to student support, we participate in third year practicum, which includes assisting students with their applications and sitting on the interview panels. We also list job advertisements and provide practical advice regarding the recruitment process, including placement opportunities and other pathways to employment.

Huon also routinely provides veterinary workplace training opportunities for tertiary students studying at national universities.

We also strongly encourage students to apply for work placements with Huon to develop practical skills, connections and workplace confidence. Huon's vertically-integrated business model allows students to apply for placements all over Tasmania in a variety of areas within the aquaculture industry. Whether a student is interested in marine operations, freshwater hatcheries, environmental management, or sub-sea technology, we have the sites and resources to make it happen.

We also offer two scholarships, one through UTAS for a third-year aquaculture student, and the other is our 'Women on Water' scholarship—a joint project with Seafood and Maritime Training (SMT). We also sponsor TSIC's bi-annual Working on Water program, designed to encourage secondary students to consider a career in fisheries or aquaculture industries.

We work closely with the Beacon Foundation, who are active in several of our government schools. Through Beacon's Growth Industry Partner Program and its High Impact Program, Huon showcases the education and training pathways students can take to gain the work ready skills needed for employment in the aquaculture industry.

Huon also has active partnerships with the *weetapoona* Aboriginal Corporation (and previously the South East Tasmanian Aboriginal Corporation). Through this partnership, **we have indigenous students from several local secondary schools that participate in a workplace pathway program**. In the program, students come to our facilities and participate in activities that focus on confidence building skills, team building skills and communication skills; essentially many of the soft skills needed for the workforce. This also gives the students a pathway to school-based apprenticeships with Huon. At present, we have three school-based apprentices through the program, with more due to commence in early 2020.

Vocational training institutes in Tasmania recognise that the aquaculture industry is a major employer for young Tasmanians entering the workforce. Accordingly, many local trade training centres, (with special mention to the Huon Valley Trade Training Centre) run aquaculture training programs. Through these programs, Huon engages with both Certificate I and II students through classroom engagement, presentations, site visits and work placements. We also use this engagement as a chance to get to know the students because quite often, those students go onto employment with Huon following their placements and training.

On an annual basis we also host UTAS medical students as part of Rural Communities Week. The future doctors learnt about dive emergencies, workplace rehabilitation and supporting emergency responses to the community.

At present (November 2019), we have had over 24 students gain employment following their training at the Huon Valley Trade Training Centre. Huon was a founding supporter of the Huon Valley Trade Training Centre and a member of staff was appointed to the initial board to help implement and consolidate its position within the community.

As the salmon farming industry is relatively new in Tasmania, we are proud to be at the forefront of the education and training pathways into this dynamic industry. We encourage and nurture our partnerships with local education and training institutions, which has led to many young Tasmanians gaining

employment with Huon through the programs and training opportunities we've help establish. The future holds many uncertainties for young people, but Huon is proud to be providing a platform for young people to grow successful, fulfilling careers in Tasmania.

W for Waste Management

No other primary industry, terrestrial farmer or indeed water and sewerage utility is paying as much attention to waste management as Huon Aquaculture.

https://www.huonnews.com/news/local-news/123-state-of-the-art-clarity

Our Whale Point salmon nursery includes a state of the art internal water treatment system which enables the facility to re-use 98 per cent of its water every single day; the remaining 2 per cent is re-used within offshore for bathing, thereby achieving 100 per cent water reuse.

The facility treats 225,000l of water and to do this, the solids within the water are removed and separated from the liquids. This process involves a belt filter then centrifugal force. The water then goes through a de-nitrification process and ozone treatment with the resulting nitrogen being mixed in with the solids. The solids are collected and removed from site to be used as fertiliser. As the solids are very low in water, it is a dry-friable mix that is high in good nutrients.

An essential part of the waste management system is bio-filters. These filters are coated in good bacteria which keeps the system in balance. For this reason, will never use antibiotics at Whale Point because this would destroy the good bacteria as well as the bad. To mitigate against this, we have very strong biosecurity measures and fish husbandry practices in place.

As this system is so effective, the water within the hatchery can be treated and reused again and again which reduces our reliance on Tasmania's freshwater supply.

Our Forest Home hatchery by-product—irrigation water—is also an excellent example of contemporary waste management. The farmland on which the hatchery is located recently received organic certification from the National Association for Sustainable Agriculture Australia. The organic certification of Forest Huon is due to fact that 95 per cent of hatchery wastewater is recirculated. As part of the recirculation process, all waste from the fish is collected and separated into solid and liquid fractions. The solids are transported offsite for use in compost and fertiliser on nearby farm land. Wastewater is filtered to remove fine solids and is then passed through ozone treatment for disinfection. Once disinfected, it passes into two settlement and storage dams and is irrigated onto the BIC leased farm land in the drier summer months.

Our flow-through hatchery sites are all non-consumptive, i.e., the water comes in, goes through the fish, is cleaned up and goes through some form of waste/nutrient removal (drums screens, settlement ponds, reed beds) before being returned to the waterways.

It is frustrating to Huon when particular community complainants don't pay the same scrutiny to sewerage waste management practices across Tasmania. Indeed, the regulated daily monitoring that is mandated for all our sites is NOT mandated for other businesses and industries.

Frequent local media reports have highlighted Tasmania's substandard water and sewerage infrastructure which results in E.coli bacteria being flushed into the Derwent River and Tasmanian beaches are frequently closed for months on end. On 2 January 2019, a system failure at the Macquarie Point wastewater treatment plant resulted in 10 million litres of unchlorinated sewage entering the River Derwent. In the months that followed, the beaches along the Derwent Estuary, from the Hobart Waterfront to Blackmans Bay, were often reported as unsafe for swimming due to high levels of bacteria and other waterborne pathogens. **Remember that fish faeces does not contain E.coli!**

This is in addition to the run-off from agricultural land farming irrigation into Tasmanian rivers.

During the 2017-18 period, TasWater reported 146 sewer overflows to the environmental regulator (the EPA). This equates to around 3.1 overflows per 100 km of sewer main.

Is the Committee aware that the Derwent Estuary Programme beach monitoring protocols are such that the beaches in the Derwent Estuary are only monitored for safe E.coli levels for four (4) months of the year (Summer months) and no monitoring is undertaken during the Winter (rainy) months when most runoff and sewerage failures occur?

Also see B for By-product for details about the re-use of organically certified wastewater at our Forest Home hatchery.

W for Wildlife Interactions

Like all farming operations we work hard to keep both our fish as well as the local wildlife safe. We believe the solution to this is good barrier technology and our industry-leading Fortress Pens and nets protect seals and birds by restricting access to the pens above and below the water line.

Seals are one of the oceans natural inhabitants and we have a responsibility to minimise any impact we have on them. The best way to protect them and keep them safe is by preventing them from entering our pens in the first place. Seals are very intelligent and naturally curious. Before the Fortress Pens were implemented, the seals could see the fish through the net so it was commonplace for seals to climb up the above-water net wall to gain entry. They were also known to ram the nets in an attempt to bite fish swimming past as well as chew on nets to create holes (bear in mind that male seals can weigh upwards of 500kg!).

Preventing birds from becoming entangled or drowning inside our pens is also a high priority for Huon. In fact, preventing bird interactions was a driver in the development of our Fortress Pens. Designed in-house by Huon staff, the pens have customised nets and barriers developed to avoid bird entries and entanglement. The Fortress Pen net designs include higher, more taught nets, differing mesh sizes and net weights (depending on where the net is located on the pen), and diamond shaped net holes (to increase stress capability). All these features are designed to prevent net holes and bird entries/entanglements while staying well above the water to ensure birds can't access the water through the nets.

We **report all wildlife and predator interactions to relevant authorities** and release regular updates via our Sustainability Dashboard. Huon also has a dedicated Wildlife team who actively work to minimise animal interactions on our farms. This team spend a lot of time checking equipment and pens making sure everything is maintained to a high standard.

Huon also works closely with the RSPCA in relation to protecting the welfare of both the stock and native wildlife. This relationship was instrumental in Huon ceasing to use some types of seal deterrents (bean bags and scare caps).

Our use of seal deterrents has significantly reduced in 2019. From January to 30 June 2019, we used zero bean bags, zero scare caps and our use of scare crackers was around 15 per cent of total industry usage. Details around deterrent use is publically available here:

https://dpipwe.tas.gov.au/Documents/RTI%20010%20-2019-20%20%28Stage%201%29.p

Our Fortress Pens were instrumental in us being able to cease relocating seals in August 2016, more than a year before the State Government banned the practice (September 2017).

We are also working with local company Taz Drone Solutions who have developed a drone with thermal imaging that enables us to safely identify seals on our leases. Seals like to haul out of the water onto any infrastructure available so one thing that we can do to minimise our interaction with them is to come up with innovative ways to spot them from a distance.

See Appendix 20 for additional information on our management of seal and bird interactions.

X for eXceptional

It's eXceptional that we have created in just over three decades a fully sustainable, ethical, intelligent, responsible, highly skilled, world leading agri-industry for a moribund state.

It's eXceptional that our industry is now the largest agri-industry in the state by a factor of over 2 and indeed the most valuable fishery in the nation.

It's eXceptional that we have created an entire supply chain industry to support us, including researchers, workforce trainers, transport contractors, equipment suppliers, scientists, water quality experts, packaging manufacturers, quality assurance specialists, and the list goes on.

It's eXceptional that we have not only supplied Australians with the first opportunity to eat fresh salmon but we have also taught them how to cook, store and share it with family and friends.

It is eXceptional that our products continue to win fine food awards which is a testament to the quality of our products.

It's eXceptional that every day across Asia we are telling the story of our place and amazing environment and products we produce.

It's eXceptional that we have invented bespoke innovative equipment that has then be on-sold to the huge overseas industry.

It's eXceptional that we have trained and employ thousands of hard working, dedicated, loyal, highly motivated Tasmanians.

We are indeed eXceptional.

Y for Yacht Clubs

The safe coordination of racing, recreation and commercial operations have co-existed on the waterways in which we farm for decades and Huon continues to work with interested stakeholders to ensure safe, shared use of the waterways. The waterways don't just exist for the sole use of one sector of the community.

Recent media attention focussed on a September 2019 incident between the SV Talofa and Huon's wellboat, the *Ronja Huon*. The skipper of the yacht involved notified MAST and informed the company of the incident. As required under maritime regulation Huon then notified AMSA within 72 hours (via written report).

At the date of this submission, Huon has not received any further requests for information from AMSA or MAST.

Huon also conducted an internal investigation which included interviewing the skipper and crew member of the Talofa along with the Master and Chief Mate of the *Ronja Huon* and a review of the GPS and AIS logs. At the time of the incident the *Ronja Huon* was a ship under the command of a Pilot Exempt master operating within the defined limits of the Port of Hobart and flying a plain white flag.

The common assumption that power always gives way to sail does not apply in this instance but regulations for avoiding collision at sea were followed by both vessels and a collision was avoided.

It is frustrating having to defend legal, appropriate action in the media purely because of the misgivings of individual community members, who often are not armed with the facts—because they are not involved in the specific situations.

At the same time, media attention was also focussed on an incident in 2016. At the time, MAST undertook a review resulting in eight recommendations, one which applied to Huon; the majority of the conclusions related to modifications required by the Management of the Sandy Bay Sailing Club.

The report noted that the *Ronja Huon* "correctly placed safety above the concerns of SBSC personnel with regards to the disruption of race results" (page 18).

This report has been publicly available for more than two years.

Earlier this month Huon approached major sailing/yacht clubs to brief them on the arrival of the new wellboat and to generally strengthen communications with their members. We had a highly productive meeting with representatives from the Bellerive Yacht Club and discussions with the Royal Yacht Club of Tasmania. The Derwent Sailing Squadron has, to date, not responded.

More recently, Huon hosted a meeting between AMSA, government, MAST, other salmon companies and yacht club representatives to discuss the use of AIS virtual markers. Again, another highly productive meeting focused on improving waterway safety for everyone.

We **regularly assist fellow water users**; as a result of our 24/7 operations our Marine Operations crews have often been called to assist boats in distress which we always do, as do other salmon farmers.

Z for Zero Tolerance (Marine Debris)

At Huon we take the responsibility to manage potential and actual marine debris seriously. Maintaining the integrity of the marine environment and surrounding areas in which we farm is a major factor in the decision-making across the company which includes a focus on eliminating marine debris at the source.

To do this, a number of activities have been implemented:

- Our workforce is trained in knot tying which reduces the amount of rope offcuts inadvertently ending up in our waterways. We have also trialled having various bins/collection points on vessels and continue to look for ways to improve our operations. We have recently rolled out rope recycling stations across our Southern operations. These stations provide a collection point for all rope offcuts which are sorted according to recycling category.

- We use technology to manage and track our on-water equipment. While we do everything we can to prevent equipment becoming loose, the use of GPS tracking devices ensures that our equipment can be immediately identified, located and removed if it strays.

  At Huon, we have integrated multiple tracking systems for our diverse on-water equipment. For our cardinal and corner marks, we use an innovative GPS tracking software developed by a company called Sealite. For our mamba lines, we use a custom GPS tracking system that Huon designed and built in-house at our Marine Projects workshop at Pillings in Hideaway Bay.

  The most recent development in our tracking innovations is the rollout of GPS tracking units for our grid cans (October 2019). Huon has proudly partnered with Tasmanian companies Definium and TasmaNet to develop and rollout this new GPS tracking technology which is currently being tested on grid cans moored in the challenging Storm Bay environment. We are still in the early stages of trialling these units, but the testing data received so far is encouraging, with the devices reporting that the grid cans have stayed in situ, and given the wave heights in Storm Bay, this is a huge achievement.

- Operating in extreme weather and high energy sites presents an ongoing challenge to ensure all equipment, ropes and general waste remains secured on our farms. Over the past few years, Huon has replaced all moorings, ropes and nets and has designed equipment to reduce the potential for marine debris. This requires continuous effort including a particular focus post-weather events and collecting marine debris at the request of the community, regardless of source. Huon also participates in the industry-wide hotline and mobile phone App.

- In the interest of transparency, we also publish details on our website of our equipment markings and the types of ropes and netting (including photographs) that we use in our operations https://www.huonaqua.com.au/identifying-our-equipment/.

- Similarly, Huon regularly educates employees, reviews operating procedures and adopts new technology and practices to continue to reduce the potential for marine debris. In the rare occasion that an employee is found to be doing the wrong thing, action is taken in the form of formal warnings and/or dismissal.

- We also list results of our marine debris clean-ups on our online Sustainability Dashboard (https://dashboard.huonaqua.com.au/environment/cleanups), as well as provide social media updates. Our employees also participate in shoreline clean-ups and a noticeable shift in employee behaviour has been observed after participation in this activity which directly drives positive change.

  In 2018, Huon removed 63m3 of debris through a number of shoreline and community clean-ups, of which 29 per cent was attributed to Huon's operations. Earlier this year, Huon crews participated in NRM South's annual shoreline clean-ups at Charlottes Cove and Bruny Island. At Charlottes Cove, over 15km of shoreline was cleared with 9 cubic metres of debris collected (1.6m3 attributable to salmon farming), while on Bruny Island 10 cubic metres of debris was collected over 20km of shoreline with 2.8m3 attributable to fish farms. This data is published at http://www.tangaroablue.org/ by NRM South.

- As all debris collected is assessed and measured, the level of "old" legacy debris is rapidly diminishing. Concurrent with those findings is that we are now consistently retrieving alarming and growing volumes of terrestrial rubbish (coming down the rivers and beaches from the land).

  The industry is accused of either wantonly creating marine debris, not caring about creating it and not retrieving debris. All of these statements are completely false.

  In the first instance we have invested millions of dollars into equipment, a valuable asset; secondly hundreds of staff work on the water every day and their safety, and those of waterway users are incredibly important, not to mention the moral, reputational or financial risk. The industry regularly collects equipment that doesn't belong to us however as responsible waterway users we feel it is our responsibility.

  It is a fact that over the decades Huon has removed thousands of tonnes of logs and flotsam from our waterways particularly after floods as a caring sensible community service to assure both the safety of our staff and the boating community.

See Appendix 13 for additional information on our marine debris policy.

Conclusion

In conclusion, it is easy for people to focus on the negative, to make baseless claims or to troll on social media. We prefer to focus on the good that our industry does whilst working tirelessly to continuously improve our operations and educate the public.

We acknowledge that there will always be people that dislike salmon farming and that is okay because all feedback, good or bad, helps shape our business for the better. We hope that the ongoing debate can be courteous, professional and based in fact. At the end of the day, every single one of our employees is a thinking and feeling person, and it is unfortunate that individuals are repeatedly singled out and publically targeted.

No-one wants to see a repeat of the long forest wars which lead to a loss of morale, fear and mental health issues within the industry workforce and within largely supportive regional communities. The salmon industry has never been an industry that can be compared to the old version of the forest industry. Yes, while mistakes were made in Macquarie Harbour, lessons were learned by both industry and the regulator and practices changed.

Huon considers all the people from regional communities **OUR PEOPLE** and we believe that those with a political agenda need to provide their own real and genuine evidence before generating fearful division within our communities, to their own political end.

We would like to again take the opportunity to invite the Committee to visit our farms to see the good for themselves, firsthand. We've heard countless times from our visitors, and new employees, that the experience of seeing our farms entirely changes and challenges the perspective that they had in their heads of what salmon farming is. It is high-tech, sophisticated, well managed, well-regulated and we hope that the Committee makes the time to challenge any notions they have of salmon farming.

We would like to thank the Committee for their time in reading this submission and extend an open door if any further information or clarification is desired.

HUON AQUACULTURE COMPANY PTY LTD

LEGISLATIVE COUNCIL INQUIRY 2019 – FINFISH FARMING

APPENDICES

HUON
AQUACULTURE

PHYTOPLANKTON (ALGAE)

- Phytoplankton (Algae) are a natural and very important component of the earth's ecosystem. They produce about 50 per cent of the earth's oxygen and they are a huge food source for aquatic animals up the food chain.
- Algae can affect fish in several ways, including:
    - Reducing dissolved oxygen (DO) in the water;
    - Mechanical irritation of the gills; and
    - Producing toxins
- Algae toxins sometimes become concentrated in shellfish at levels that can adversely affect human health. However, algae toxins are not concentrated in fish, therefore there are no human health risks from eating fish. Safety of shellfish is monitored and managed by the Tasmanian Quality Assurance Program (now ShellMAP Regulatory Services).
- Huon collaborates with the ShellMAP Program by providing all of Huon's algae reports from Analytical Services Tasmania (at no cost) in exchange for access to ShellMAP algae reports.
- Huon monitors the number and species of algae in the water on a routine basis, as well as regularly submitting water samples from lease sites to Analytical Services Tasmania (AST)
- Huon has submitted over 2,000 water samples to AST since Jan 2001.
- Huon provides internal training to staff to improve their skills in algae identification and knowledge of the impacts algae can have on farmed salmon.
- In 2015, Huon facilitated a visit from Nicky Haigh who manages an algae monitoring program for industry in Canada. Nicky ran a series of training courses and presentations and provided her "Harmful Plankton Handbook" which is now widely distributed across Huon sites and used as a detailed reference guide by Huon staff.
- Huon staff also attend algae training workshops held at the University of Tasmania (UTAS) and hosted by global algae expert, Professor Gustaaf Hallegraef.

PHYTOPLANKTON OVERVIEW

Phytoplankton (often just called "algae") are microscopic plant organisms that live in well-lit surface layers of oceans, seas, lakes and other water bodies.

Algae are like trees and other plants in that they produce oxygen during the day and use up oxygen during the night. This is why the dissolved oxygen (DO) level at our salmon leases is often lowest first thing in the morning and higher later in the day when large numbers of algae are present.

Algae are a natural and very important component of the earth's ecosystem as they produce about 50 per cent of the earth's oxygen and they are a huge food source for aquatic animals up the food chain.

Certain algae can be responsible for fish kills and this is why algae species and numbers are monitored closely on salmon farming sites.

Most algae are too small to see without a microscope. However, when present in high enough numbers, they can make the water turbid (discoloured). They may appear as a green discolouration of the water due to the presence of chlorophyll (same green pigment that is in green leaves of trees) within their cells. However, the actual colour may vary with each algae species due to other pigments also in cells (e.g. red pigments).

HOW CAN ALGAE AFFECT FISH?

Not all algae species will kill fish. However, certain algae species and large concentrations of algae can be problematic.

Large concentrations of algae are known to use up oxygen during the night, resulting in low DO levels early in the day. In addition, when very large numbers of algae die off at the end of their bloom, they cause a significant reduction in DO as a result of bacteria decaying the dead algae (in the same way as happens during composting).

Certain spikey algae (particularly with barbs on the spikes) can cause mechanical irritation to the fish gills. In some circumstances, fish respond to this by producing excessive mucus, which can cause suffocation. The irritation and injury caused to the gills can also become a focus for infection.

Barbed algae are the most dangerous among the spiky algae varieties because the barbs on their spines get stuck in the gills of fish and are difficult to dislodge.

Certain algae also contain toxins that cause physical damage to the gill surface, which if severe enough, can result in suffocation. In some algae, these toxins can affect other areas of the body (e.g. neurotoxins or hepatic toxins).

TOXIC ALGAE AND SHELLFISH

The Tasmanian community is probably most familiar with some species of algae that may produce natural toxins that adversely affect human health. These toxins can become concentrated in the tissues of filter feeding shellfish (e.g. oysters, mussels, scallops and clams) at levels which may become potentially harmful to people who eat them. There are four major classes of human illnesses caused by the ingestion of shellfish containing these toxins. The toxins don't cause any health issues for the shellfish containing them.

However, it is important to note that none of these four toxins cause any health issues in fish and are not concentrated in fish, so there is no danger to human health from eating fish.

The presence of algae toxins in shellfish is monitored closely by the Tasmanian shellfish industry and the government.

For more details on the ShellMAP Program you can go to the following link on the Tasmanian DPIPWE website https://dpipwe.tas.gov.au/biosecurity-tasmania/product-integrity/food-safety/seafood/shellfish-quality.

Huon has been collaborating with the shellfish monitoring program for many years by routinely providing all of Huon's algae monitoring reports from Analytical Services Tasmania (AST) to the Shellfish Program at no cost in exchange for Huon receiving algae reports from the Program.

HUON'S ALGAE MONITORING PROGRAM

Huon monitor the water for algae species in two ways:

- **On Site Monitoring**: Every farm zone has a dedicated high-quality stereo microscope allowing on water staff to routinely study water samples (or immediately if they have any suspicion that algae may be causing problems, e.g. change in colour of the water, unusual fish behaviour).

Fish behaviour and water turbidity are also monitored by cameras in every pen at all marine leases, with the video relayed to screens located in the central control room at Huon's Hobart Office. This provides another level of observation, increasing the opportunity for rapid identification and mitigation of potential issues associated with algae.

The microscope also has the capability of capturing and sending images of algae to other key Huon staff (e.g. the Fish Health or Marine Environment Managers) for guidance or confirmation, or to a large number of staff for notification and alert purposes. This enables rapid response where needed to potential algae problems. This capability also enables Huon staff to send these images anywhere in the world to people with expertise in algae for confirmation of species, identification of new species and guidance.

Huon also has a well-equipped laboratory facility located at our Hideaway Bay facility near Dover.

- **Submission of Water Samples to Analytical Services Tasmania (AST):** In addition to on site monitoring by Huon staff, Huon submits regular water samples from every lease to AST. The number of samples varies depending on time of year, but in summer it is often weekly. These submissions provide an expert detailed assessment of algae numbers and species. An example of an AST Report is provided as an attachment.

  As above, all of Huon's AST Reports are routinely forwarded to the ShellMAP.

  Huon has submitted over 2,000 water samples to AST for algae assessment since January 2001.

HUON STAFF TRAINING

Huon provides internal training and a range of documents and reference materials to staff to improve their skills in algae identification and knowledge of the impacts algae can have on farmed salmon.

Huon also has a number of Standard Operating Procedures relating to the measures staff must implement in the event of an algae event.

In 2015, Huon facilitated a visit from Nicky Haigh who manages the Canadian algae monitoring program for the Canadian industry. Nicky ran a series of training courses and presentations and provided a copy of her "Harmful Plankton Handbook" which is widely distributed across Huon sites and used as a detailed reference guide by Huon staff.

From time to time, a significant number of salmon industry staff will also attend algae training workshops at the University of Tasmania (UTAS) hosted by Professor Gustaaf Hallegraeff who is internationally recognised as an algae expert. This provides an excellent opportunity for staff to improve their skills and discuss algae related issues.

BROADSCALE ENVIRONMENTAL MONITORING PROGRAM (BEMP)

- The Tasmanian salmon industry leads the world in terms of best-practice monitoring for potential broadscale effects.
- The Broadscale Environmental Monitoring Program (BEMP) was initiated in 2009 to provide knowledge and information on ecosystem function in the D'Entrecasteaux Channel and Huon Estuary. The objective of the program remains to document broadscale spatial and temporal trends for key environmental parameters, allowing assessment of the environmental effects of finfish aquaculture in the region.
- The BEMP program has long been the only fish farm monitoring program in the world assessing effects outside AZE's (Allowable Zone of Effect) or close to/inside the farms.
- The BEMP program includes assessment of water column and sediment health at a broadscale level across the study area and was largely structured around recommendations of CSIRO and IMAS (UTAS as it was then) taking into account previous studies undertaken in the region.
- Sediment sampling includes benthic infauna, stable isotopes, particle size, visual assessment, redox analysis and sulphide measurements. Visual assessment, redox and sulphide analysis is carried out each year, while analysis of benthic infauna, stable isotopes and particle size is undertaken every four years. In the intervening years these samples are collected, preserved and retained.
- Water quality analytes include physico-chemical parameters (temperature, dissolved oxygen, salinity), nutrients (dissolved nutrients: ammonia, nitrate, phosphate, silicate, total nutrients: total nitrogen, total phosphorous), chlorophyll A and phytoplankton species counts. Water quality sampling is undertaken monthly from May to January and fortnightly from February to April.
- A total of 15 sites are included in the monitoring program; including nine sites in the D'Entrecasteaux Channel MFDP, five sites in the Huon River/Port Esperance MFDP's and a control site at Recherche Bay.

HISTORICAL DATA

Sediment Health

Analysis of benthic infauna samples collected in 2009 and 2013 showed no evidence of a major shift in species composition or organic enrichment, with community composition very similar between surveys. The only potential indicator of a change in ecosystem condition was an increase in abundance of the introduced bivalve species *Varicorbula gibba* and *Theora lubrica* that were recorded at some sites. Since only two sets of faunal data have been examined it is not clear whether this is an increasing trend or part of a natural cycle.

Annual visual assessment of sediment cores across the survey period in the reporting period (i.e. 2012-2016) showed no major changes in sediment characteristics since the inception of the monitoring program. Patterns of redox potential also appeared relatively consistent for all survey years.

Redox values observed in 2016 were within the range of values observed in the previous years, and there was no evidence of a decrease in redox potential for any of the monitoring sites. Organic enrichment is typically indicated by redox values < 0 mV and there has been no such evidence through the course of the monitoring program. At most monitoring sites, average redox values have consistently exceeded 100 mV, these levels are indicative of well oxygenated sediments.

Sulphide levels have remained very low across all sites and survey events, with the majority of readings close to zero or not detectable. No site has a sulphide concentration exceeding 100 mV, suggesting there to be no significant evidence of broad scale organic enrichment across the survey area.

Particle size and stable isotope analysis were analysed in 2009 and 2013. For particle size analysis, patterns of sediment grain size were comparable between years and reflect the variation in wave exposure and current strength across the survey area. For stable isotope analyses, C:N ratios and 13C/15C results were comparable between the 2009 and 2013 surveys. The stable isotope analyses showed no evidence of broad scale impacts attributable to fish farming in the study area. Data covering a greater span of sampling years will be important to determine levels of stable isotope variation for the D'Entrecasteaux Channel and Huon Estuary.

- Overall, based on the benthic infauna and sediment chemistry parameters considered (visual assessment, redox, sulphide, particle size, stable isotopes) for the reporting period 2012/13-2016/2017, there were no consistent trends considered strong evidence of organic enrichment at the broad scale monitoring sites sampled under the BEMP program.

Water Quality

Physico-chemical parameters (temperature, dissolved oxygen, salinity) were generally comparable between survey years. For dissolved oxygen, consistent seasonal patterns were evident, particularly in bottom waters, with oxygen concentration reaching minimum levels in late summer and autumn.

- Patterns of dissolved oxygen were very similar for D'Entrecasteaux Channel sites and the control site. Huon River sites, in contrast, showed considerable variation. Bottom water dissolved oxygen concentrations tended to decrease with increasing distance upstream, with lowest average bottom water dissolved oxygen measured at site 13. Patterns of dissolved oxygen across the reporting period were generally comparable to earlier sampling years.
- For most nutrients (i.e. nitrate, phosphate, silicate, total nitrogen, total phosphorous), concentrations measured in the 2012/13-2016/17 reporting period were within the range recorded in previous sampling years and there was no evidence of broad scale changes in water quality characteristics.

Patterns of ammonia concentration within the 2012/13-2016/17 reporting period were also generally within the range recorded during previous sampling years at most sites, with peaks in bottom water ammonia largely driven by Huon river estuary sites (sites 10-14). However, at some sites there was a trend of higher ammonia concentrations in the latter part of the reporting period (2014/15 onwards). These slightly higher ammonia levels were most evident at sites eight and nine in the D'Entrecasteaux Channel and site 10 in the Huon river. Average ammonia levels recorded during December 2014 were also among the highest mean values recorded since the inception of the monitoring program (mean bottom water ammonia concentration 0.18 mg-N/L).

Chlorophyll A patterns were characterised by peaks in spring and autumn in most years, with seasonal minimums occurring in winter each year. The highest average chlorophyll A concentration during the 2012/13-2016/17 reporting period occurred in September 2015, when chlorophyll A averaged 3.5 mg/m3 across all sites.

- There was no evidence of increasing chlorophyll A concentrations over the reporting period, nor was there evidence that the frequency and/or magnitude of bloom events has changed. There was also no evidence of increasing abundance of harmful phytoplankton species during the reporting period.

Proposed Trigger Levels
Proposed baseline values and trigger levels were established by Thompson et al. (2008) following water quality and sediment surveys in the D'Entrecasteaux Channel and Huon Estuary. The trigger values provide a framework for developing management responses based on the extent a particular parameter exceeds the trigger value. They also take into account the various risks to ecological structure and function. It is important to note that the proposed trigger levels are not statutory limits and their purpose was to inform regulatory management of the industry. Trigger level assessment categories include level one (low risk), level two (moderate risk) and level three (high risk) categories. Assessment of trigger values against proposed sediment and water quality analytes are summarised below.

Trigger levels comparisons for sediment
For benthic infauna there is considerable subjectivity in the application of proposed risk categories. For example, the level one risk category (i.e. significant change over time at one or more sites) was not straightforward to apply.

- At some sites there was an increase in abundance between 2013 and 2017 (e.g. sites B1, B4). However, at these same sites species diversity also increased over the same period.

While changes such as this have occurred between 2013 and 2017 these patterns are not considered evidence of organic enrichment and were not assessed as level one (low risk). Although guideline values are not specifically defined included for introduced species, the increase in *Varicorbula gibba* abundance at some sites (i.e. B4, B10, B13) was notable, with the presence of this species considered evidence of organic enrichment in muddy habitats. The increase in abundance of introduced species at these sites was considered a level one (low) risk. It should be noted that infauna trigger level comparisons were somewhat limited due to there being only two datasets involved.

- Sediment chemistry parameters were generally very similar across survey years.

There were occasional instances where a parameter changed between sampling times which could be interpreted as a level one risk. For example, variation in the magnitude of redox potential was recorded at some sites between sampling events. Importantly, such variation was not consistent with broad scale organic enrichment effects and is likely due to the inherent vagaries of redox measurement.

Trigger levels comparisons for water quality
For water quality a range of trigger values were assessed, incorporating nutrients (ammonia), chlorophyll A, phytoplankton bloom frequency, and dissolved oxygen. The classification of trigger values depended on the analyte concerned and in some cases involved a complex range of criteria.

There were several examples of level one (low risk) ammonia trigger values being reached in the reporting period, but for most sites there was no evidence of an increasing frequency of exceedances over the duration of the monitoring program. Exceptions to this general pattern were evident at sites eight and nine in the D'Entrecasteaux Channel and site 10 in the Huon. At these sites there was a tendency for an increased frequency of exceedances based on summer mean values.

Summer mean ammonia values measured in 2014/15 at site 10 were the highest recorded since the inception of the BEMP program. Although recent years have seen relatively high summer ammonia levels at site 10, it should be noted that similarly high values have been recorded previously (e.g. 2009/10; level two moderate risk level). For chlorophyll A analyses there were occasional level one (low risk) levels reached based on individual sites across the reporting period.

When average values across each MFDP were considered for the 2012/13-2016/17 reporting period there were four level two (moderate risk, i.e. summer mean + 100 per cent or annual mean +50 per cent) and three level one (low risk, i.e. summer mean +50 per cent) exceedances evident.

- When all survey years were considered, there was no indication of an increase in the frequency of trigger levels being reached. Exceedances of proposed trigger levels appear linked to seasonal phytoplankton blooms which vary considerably in their timing, frequency and intensity. The proposed chlorophyll A trigger values were considered very complex to apply and interpret, since they incorporate specific sites as well as MFDP areas.

For dissolved oxygen (absolute and percentage saturation), there were no instances of trigger levels being reached for the D'Entrecasteaux Channel region across the reporting period. For the Huon sites level one (low risk; any two channel observations ≤ 6 ppm; any two bay observations ≤ 5 ppm) was reached in most years. Overall, there was no evidence of an increase in trigger level exceedances based on oxygen concentration or saturation during the reporting period.

Extract from: Broadscale Environmental Monitoring Program. D'Entrecasteaux Channel and Huon Marine Farming Development Plan Sites Combined Annual Report (Version 1.1) 2012/13-2016/17. November 2017

https://epa.tas.gov.au/Documents/Final%20BEMP%202012-2017%20V1.1.pdf

https://epa.tas.gov.au/Documents/Huon%20BEMP%20Annual%20Report%202017-18.pdf

BIOSECURITY

- All good farmers take a proactive and holistic approach to safeguarding the health and welfare of their stock. At Huon, this involves feeding quality diets, good site management, fish husbandry, biosecurity measures and of course, vaccinating our stock.
- Biosecurity in its broadest definition is the prevention of disease-causing organisms entering or leaving any site where they pose a risk to farmed stock, other animals, 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 and never totally eliminated from aquatic systems.
- Huon was named as Australian Biosecurity Farmer of the Year in 2013.
- No salmon imports are permitted to enter Tasmania as this has the potential to wipe out the entire industry through the introduction on an exotic disease or pathogen. This is the same with honey, blueberries, shellfish and other farmed Tasmanian products.

DISEASE PATHWAYS

Specific pathways by which exotic or new diseases not currently occurring in Tasmanian farmed salmonids could be introduced, or by which existing diseases could be spread between sites include:

- Live fish movements, including the water in which they are transported. Live fish includes: eggs, fry, smolt and brood stock.
- Infected fish products including: harvest fish, fish products, waste products and mortalities.
- 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, crustaceans, zooplankton, algae). These species may also be carrying potential pathogens not yet introduced into farmed stock.
- Recreational anglers and wild fishers including: contaminated tackle, vehicles, bait.
- Intake water (this includes town, river and bore water sources at hatcheries).
- Wildlife (e.g. birds, rodents).

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

Early diagnosis and notification is essential for effective management of new or emerging risks.

The Tasmanian *Animal Health Act 1995* requires the salmon industry by law to report any case or suspicion of a notifiable animal disease. These notifiable diseases are all serious. Notifiable diseases in Tasmania are

broken down into two lists – List A and List B *(see full list of notifiable disease at this link https://dpipwe.tas.gov.au/biosecurity-tasmania/animal-biosecurity/animal-health/notifiable-animal-diseases)*.

HUON VETERINARY HEALTH AND BIOSECURITY PLAN

Huon has a comprehensive Veterinary Health and Biosecurity Plan (VHBP). The VHBP is based on a detailed Risk Assessment Review across Huon operations, consolidated with the collective experience and standard operating procedures of Huon staff over 30 years and an extensive review of biosecurity practices in overseas salmon producing countries. The VHBP describes the principles and procedures used by Huon to maintain the health and wellbeing of fish throughout all stages of the lifecycle from hatchery to harvest. As such, the VHBP encompasses all marine farm, hatchery and processing sites operated by Huon.

The VHBP aims to identify and define areas of management and husbandry where agreed protocols and procedures are targeted to "best practice" to optimise salmonid health and welfare. The VHBP outlines the objectives and aspirations which are regularly reviewed and updated to promote continuous improvement.

Disease 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.

TASMANIAN SALMONID INDUSTRY BIOSECURITY PLAN

Tasmania operates strict biosecurity measures to which the salmon industry complies (refer Tasmanian Biosecurity Strategy 2013-2017 https://dpipwe.tas.gov.au/biosecurity-tasmania/biosecurity-policy-strategy-publications/tasmanian-biosecurity-strategy-2013-2017).

The Tasmanian industry prepared a state-wide biosecurity plan back in 2013. However, following the Blue Future Salmon Conference, salmonid industry veterinarians prepared a more comprehensive updated plan based on the current state of knowledge, learnings from the conference and relevant to the dynamic and evolving industry operations and practices.

The Draft Plan has been reviewed by a third party expert – Professor Larry Hamell (University of Prince Edward Island, Canada). A final version of the Plan has been agreed in consultation with the relevant Tasmanian authorities i.e. Biosecurity Tasmania, Marine Farming Branch (DPIPWE), Inland Fisheries and the EPA.

Industry and government is currently working together to formalise the implementation of the measures in the Plan and review how the Plan can best be managed within the new Biosecurity Act framework.

AUSTRALIAN BIOSECURITY FARMER OF THE YEAR

Huon was named Australian Biosecurity Farmer of the Year in the livestock category in 2013. This prestigious award is hosted by the Kondinin Group and the ABC Rural. The biosecurity category aims to promote and reward excellent biosecurity practice in Australian industry.

The highly respected industry accolade recognises farmers and farming families who are focused on the biosecurity of their farming enterprise.

Huon was the first aquaculture company to receive this award.

EXPERIMENTAL AQUACULTURE FACILITY (EAF)

- Huon is a partner in the Experimental Aquaculture Facility, a world class research facility which opened in October 2015.
- The EAF began as a partnership between Huon Aquaculture, Skretting, the University of Tasmania's Institute for Marine and Antarctic Studies, and the Tasmanian and Australian Governments. The $6.5M facility is located at Institute for Marine and Antarctic Science's (IMAS) Taroona fisheries and aquaculture research centre, and is the first of its kind in the Southern Hemisphere.
- The EAF supports collaborative research with the Tasmanian salmon industry on the health and nutrition of Atlantic salmon by directly conducting commercially-relevant research. This research is fundamental to the economic and environmental sustainability of the aquaculture industry in Tasmania, Australia, and internationally.

GENERAL RESEARCH

- Tasmanian waters, and the operations of the salmon industry, have been, and continue to be, extensively researched and monitored by world-class scientific organisations. Every year the industry spends millions in research and development, investing in the expertise of local scientists at IMAS and Commonwealth Scientific and Industrial Research Organisation (CSIRO), as well as other national and international highly respected research and development organisations (James Cook University, FRDC as examples)
- Future planning of Tasmania's salmon industry is predicated on an ongoing precautionary approach underpinned by science from independent experts, as well as other non-government organisations/third parties who either exercise an oversight role, run their own monitoring programs or coordinate other relevant research activities.

WHY THE EAF EXISTS

- The primary purpose of the EAF is to provide specialist research facilities to support the growth and sustainability of the salmonid industry. Tasmania's salmon farming is by far the largest aquaculture industry in Australia, and accounts for the bulk of seafood production in Tasmania.
- The partnership between industry and IMAS researchers allows us to address local needs as well as global questions about climate change effects, seafood quality, replacement of marine ingredients and Amoebic Gill Disease (AGD).
- The EAF is advancing the understanding of Tasmania's aquaculture industry (mainly salmon and oysters) by addressing issues of animal physiology, genetics, health, nutrition, welfare and production, environmental management, food safety, and climate change impacts.
- The EAF is a key component in the industry's strategic future, providing a research capability that underpins growth, sustainability and the ability to adapt to a changing environment of increasing

seawater temperatures. For salmon farmers, the EAF is already delivering improved environmental benefits through:

  - Furthering research into AGD management;
  - Reducing the environmental impact of salmonid farming;
  - Reducing the fish losses due to high sea water temperatures; and
  - Maintaining size of fish during extreme high temperatures.

- The facility has specially designed systems to control environmental conditions, including light, water quality and temperature, to examine climate change effects relevant to local conditions. It features recirculation aquaculture systems, twelve 7,000 litre tanks, twelve 2,500 litre tanks and two stock tanks of 13,000 litres.

FEED BARGES

- Our feed barges are moored, centralised vessels that are remotely controlled from our Hobart office. They have been designed to provide feed to our fish pens without on-board staff.
- Huon currently has six operational feed barges; five 320 tonne capacity feed barges and one 600 tonne capacity feed barge (the Hogan). There is also another 600 tonne capacity feed barge due for arrival in May 2020.
- Huon introduced the first feed barge in 30 June 2014.
- A feed barge can feed up to 12 pens simultaneously and Huon's current fleet of feed barges has a total value of $45.5M.
- The Hogan (600 tonne) is the largest feed barge in the southern-hemisphere, measuring at 37 metres long and 12 metres wide. The 320 tonne feed barges measure at 23 metres long and 12 metres wide and contain over a week's work of fish feed, while the 600 tonne Hogan vessel contains over two weeks' worth of feed.

FEED BARGE TECHNOLOGY

Our feed barges house high-tech feed systems that utilise a video pellet-recognition system to determine when the fish are hungry, and when they are full (thereby stopping the feed supply). In this way, we allow the fish's natural behaviour to determine when and how much they feed. Similarly, our feed system allows all fish to feed at the same time; fish are fed at dawn and dusk which is salmon's preferred natural feeding time.

We use a patented feed spreading system that distributes the feed over a greater area of the pen allowing less dominant fish equal access to feed from anywhere in the pen resulting in efficient and consistent fish growth.

The technology allows less wastage and therefore reduces Huon's overall environmental impact. The real-time video footage captured by the system also allows extensive monitoring between feed times.

By utilising remote operations, Huon can feed fish, inspect nets and other infrastructure, remove mortalities, and monitor the environment remotely from our Hobart office. Feed barges also allow us to monitor wave actions and current buoys, as well as capture live video feeds of the weather conditions.

The feed barge's mounted, centralised feed systems provide better reliability and consistency of feeding due to minimising downtime when staff couldn't safely access the feed hoppers (used prior to feed barges).

320 TONNE FEED BARGES

Huon's first feed barge, aptly named the 'Huon', was launched in June 2014 and represented the first of five 320 tonne feed barges that would be integrated into Huon's operations in the coming three to four years.

Huon are proud to be supporting local businesses in the creation of new technologies and infrastructure, which is why all five 320 tonne feed barges (not to mention the two 600 tonne feed barges) have been built in Tasmania by Tasmanian-based company Crisp Bros. & Haywards at their Margate shipyard. It takes 15 companies, 187 people and 22,000 work hours to build one 320 tonne feed barge.

320 tonne feed barges and their locations:

- The Huon – Zuidpool North (Hideaway Bay farm site)
- The Hippolyte – Zuidpool South (Hideaway Bay farm site)
- The Half Tide – Garden Island (Hideaway Bay farm site)
- The Hibbs – Yellow Bluff 1 (Storm Bay farm site)
- The Hope – Yellow Bluff 2 (Storm Bay farm site)

600 TONNE FEED BARGES

Designed by Huon in collaboration with AKVA and Crisp Bros. & Haywards, the Hogan was officially launched in December 2018, costing an estimated $10.5M.

The 600 tonne Hogan is the largest feed barge in the southern-hemisphere, measuring at 37 metres long and 12 metres wide. The feed barge's 600 tonne capacity allows the vessel to store two weeks' worth of fish feed, supplying 12 pens in Huon's high-energy Storm Bay sites.

A collaboration of approximately 100 employees and contractors were involved in the project, with the barge taking approximately 82,000 hours or 30 man-years to build, with the coatings alone taking 4.25 man-years to apply.

Huon's second 600 tonne feed barge (yet to be named) is due to be launched in May 2020.

FISH HEALTH AND WELFARE

- All good farmers take a proactive and holistic approach to safeguarding the health and welfare of their stock. At Huon, this involves feeding quality diets, good site management, fish husbandry, biosecurity measures and of course, vaccinating our stock.
- The welfare of our fish is a priority for us; every farmed animal has the right to move and behave normally (which is why, in 2018, we were named as Australia's only RSPCA Approved Salmon Farmer).
- Effective management of fish health, welfare and biosecurity is critical to successful aquaculture. Huon takes fish, welfare and biosecurity very seriously which is why Huon employs two full time veterinarians.
- In addition to our two veterinarians, Huon employs 21 people with University qualifications encompassing one or more of the areas of aquaculture production, environmental science, fish health, welfare and biosecurity training and 115 employees who have completed, and 90 staff who are in the process of completing the Certificate III in Aquaculture qualification through the Seafood Training Tasmania. This course contains significant components on fish health, welfare and biosecurity.
- Huon maintains a comprehensive Veterinary Health and Biosecurity Plan (VHBP) that forms the basis of all Huon's protocols and procedures to address fish health, welfare and biosecurity matters. The VHBP is regularly reviewed and updated.

VACCINATION DEVELOPMENT

Millions of dollars have been invested in vaccine development and across the salmon industry vaccines are now commercially used to successfully control up to five serious disease pathogens.

The salmon industry in collaboration with the Tasmanian government and the Fisheries Research and Development Corporation (FRDC) has invested millions of dollars in the development of the Centre of Excellence for Aquatic Animal Health and Vaccines (CEAAHV) in Launceston. This is a world-class aquatic animal diagnostics and health related research facility which plays an important role in assisting the Tasmanian industry to stay at the forefront of fish health, welfare and biosecurity.

Fish have a functional immune system similar to that in mammals. This means that vaccinations can be used in the same way to improve fish health and welfare outcomes. Effective vaccines not only minimise or eliminate the illness or mortality that can occur with certain diseases, they also minimise or eliminate the need to resort to antibiotic and chemical treatments and significantly improve the growth and performance of farmed salmon.

HUON'S VETERINARY HEALTH AND BIOSECURITY PLAN

See Biosecurity Fact Sheet for details.

TASMANIAN SALMONID HEALTH SURVEILLANCE PROGRAM (TSHSP)

The salmon industry's focus on good fish health, sustainable production within a biosecurity framework, is supported through the provision of excellent aquatic animal health services. These primarily take the form of the Tasmanian Salmonid Health Surveillance Program (TSHSP), diagnostic services at the Animal Health Laboratory in Launceston and research at the Centre of Excellence for Aquatic Animal Health and Vaccines (CAAHV) to develop effective bacterial and viral vaccines and improved diagnostic tests.

The TSHSP has been operating for 27 years since it was initiated in 1992. The TSHSP is jointly operated and funded by the Tasmanian salmonid industry and DPIPWE with an annual review to ensure it provides the best and most cost-effective outcomes.

The purpose of the TSHSP is to support the sustainability of the Tasmanian salmonid industry, the industry's biosecurity advantage and access to domestic and international markets. The TSHSP is the principle mechanism for Biosecurity Tasmania to critically assess endemic disease incidence and the impact of disease on Tasmanian salmonid production. Objectives of the TSHSP are:

- Investigation for evidence of a range of salmonid diseases exotic to Tasmania (List A diseases), but not necessarily exotic to Australia.
- Monitoring of incidence of endemic diseases and their causative agents to support regional biosecurity management within Tasmania.
- Monitoring of farmed stock for early detection of new or re-emerging pathogens.
- Investigation of significant or unusual morbidity or mortality events in farmed salmonid species to identify the cause, either infectious or non-infectious.
- Collection of disease incidence data for Biosecurity Tasmania to support evidence based policy, state-wide biosecurity management and regional biosecurity agreements between salmonid aquaculture companies in Tasmania.

The Program supports domestic and international market access for the salmonid industry. The integrity of the incidence data is based on the large range and breadth of submissions to the Tasmanian Animal Health Laboratory in Launceston.

The Tasmanian Animal Health Laboratory, through the Centre of Excellence for Aquatic Animal Health and Vaccines (CAAHV) in Launceston, also contributes to research on endemic aquatic diseases including vaccine and diagnostic test development. This also includes collaboration with the CSIRO Australian Animal Health Laboratory in Geelong which is Australia's sentinel animal health facility recognised internationally.

The Tasmania salmonid industry's contribution to the TSHSP in 2019/20 will be approx. $650,000.

CENTRE OF EXCELLENCE FOR AQUATIC ANIMAL HEALTH AND VACCINES (CEAAHV)

The Centre of Excellence for Aquatic Animal Health and Vaccines (CEAAHV) is a tri-partite arrangement between the salmon industry, Biosecurity Tasmania of the DPIPWE and FRDC. Each partner derives significant benefit from the CEAAHV activities that they have commissioned. The specialised facilities are the result of co-investment by the three partners in 2013.

Establishment of the CEAAHV was key to meeting the salmon industry's need for solutions to known and new disease threats. The resources available to the CEAAHV are highly specialised to meet the need for developing bacterial and viral vaccines.

ANTIBIOTICS

We believe that disease control in salmon requires a holistic approach. Good site management, fish husbandry and rigorous biosecurity measures are central to reducing the risk of disease outbreaks and controlling the spread of infectious diseases. Vaccines are important in preventing disease outbreaks but cannot control all losses. Medication such as antibiotics is used as a last resort to avoid significant animal welfare issues and stock losses.

We have the attitude that antibiotics should only be used as a last line of defence. This mind-set means that we are continually working to develop proactive diet regimes and vaccines to allow our salmon to combat known illnesses and lead healthy lives.

If our vet feels there is a need to treat fish with antibiotics it is supervised, reported and strictly regulated by government. The antibiotics are allowed to pass through the fish long before it is harvested in accordance with regulatory requirements. Huon has not used antibiotics at sea since 2016 when a single pen was treated (see Huon's website for publication of antibiotic use including quantities and pens treated) https://www.huonaqua.com.au/6657-2/.

Any antibiotic use is reported to State Government in real time.

Huon also participates in an annual national residue survey to monitor levels of therapeutants, ensuring we comply with a maximum residue limit, which refers to the highest concentrations of a chemical residue that is legally permitted or accepted in a food, based on good agricultural and chemical use practices.

BATHING

Tasmania is a unique environment for salmon farming due to Amoeba, a single-celled microscopic organism that is native to Tasmania. They multiply and reduce water flow at the gill surface that can limit oxygen supply to the fish that can cause death if not treated.

They are unique to the saltwater marine environment and cannot tolerate freshwater, whereas salmon can adapt between salt and fresh. Bathing our fish in fresh water removes them of Amoeba.

We bathe our fish in industry-tailored wellboats designed to transport and bath the fish in a seamless, low-stress environment. Using wellboats to bath our fish also allows Huon to transport all the fish into an enclosed system. This method greatly reduces the potential for disease transfer, improving our biosecurity practices and impact on our fish.

Huon was the first company globally to use a wellboat for the purpose of bathing fish in freshwater. What this means is that rather than needing to tow large liners full of freshwater, fish are transferred into the wells of the boat to swim around for a few hours before they are returned back to a pen.

HARVESTING

Harvesting fish humanely is crucial to not only for fish welfare, but also for ensuring high quality salmon as stress during the process results in softer and gaping flesh.

We have worked closely with Baader Seafood Innovations to help them develop a method of harvesting that is considered world's best practice and is RSPCA UK awarded. This collaboration led to world first technology that uses automatic stunning and bleeding machines to harvest our salmon.

Our harvest machine works by utilising the salmon's natural instincts to swim against the current. They then swim down a slide and are automatically stunned and bled. An added benefit of this technology is that the pre-rigour time is longer (approximately eight to 12 hours), which is crucial to achieving the premium Huon quality salmon our customers have come to expect.

FOREST HOME HATCHERY

- Construction of our $35 million Forest Home Hatchery at Judbury (situated on the Huon River) began in 2014. Egg incubation at the site commenced in August 2015, with the first fish going to sea in June 2016. The site was officially opened by Premier Will Hodgman MP in November 2016.
- This hatchery is a Recirculation Aquaculture System (RAS) facility meaning that it provides the best growing conditions for the fish while also having a minimal environmental footprint.
- At the time of building, Forest Home represented the second generation of our recirculation hatcheries. Lonnavale was our first RAS facility, representing a shift from our traditional flow-through style hatcheries.
- The hatchery has five separate systems under one roof; two for incubation and three for fish, with each section totally independent of the other to provide the maximum level of biosecurity.
- The building is green and tiered, designed to blend into the landscape to reduce the visual impact on neighbours. Riparian zone tree planting has also been undertaken across the property.
- Fertilised eggs from Lonnavale and Springfield hatcheries are hatched and grown on at Forest Home. Once they reach 150-250g, there are transferred to sea. In some cases, salmon fry weighing between 15-50g are transferred to Whale Point nursery to be reared until their sea transfer.
- When fully operational, the Forest Home hatchery produces 2.1 million top quality smolt over three batches, mainly during March/April, May/June and September each year. Two million fry are also supplied to our Whale Point nursery over two batches in November/December and May/June.
- The facility is capable of producing 580 tonnes of fish across the year, providing Huon Aquaculture with potentially 17,000 tonnes of whole fish at harvest.
- The water used in the hatchery comes from the nearby river or from a bore on the property. This water is filtered and disinfected with ozone and UV treatment before entering the hatchery. This process ensures the conditions within the hatchery are controlled to provide optimal growing conditions.
- The Forest Home farmland on which the hatchery sits was certified as organic by NASAA in late 2019.
- The hatchery provides employment for 10 people. Working in shifts, the Forest Home team comprises of a management team, maintenance team, fish health team, data entry and landscaping staff, as well as four casuals who remove unviable eggs and alevins.
- Sitting on 170 acres, the property has heritage buildings including a federation homestead, apple sheds and other lean-to buildings that have previously been converted into boardrooms and entertaining areas.

THE HATCHERY

As Forest Home Hatchery is a RAS facility, it recirculates 95 per cent of its water back through the hatchery on a daily basis.

To optimise welfare and performance, the environment within the hatchery is carefully and constantly managed, with regard to light, water flow, PH, dissolved oxygen, carbon dioxide, alkalinity, temperature, and nutrients. Additionally, feed is carefully controlled to minimise potential wastage.

The hatchery contains five separate sections, each with its own recirculation system to mitigate any potential biosecurity issues. These sections house the different stages of the salmon's lifecycle in freshwater:

- Incubation: during this phase, up to three million eyed eggs are introduced to the facility and kept in covered incubation rooms until they are ready to start feeding. The development rate of eggs and yolk sac is controlled by temperature to produce three different batches of fry. When the yolk sac is absorbed and fish are ready to feed, they are transferred to the tanks in the first feed section.
- Fry: weighing at 0.18g-0.23g, the small fish are introduced to 12 tanks for the start of feeding and are grown up to 10g before being moved to the parr tanks.
- Parr: the 10g fry are grown in 12 parr tanks until they are approximately 60g, at which point they are moved to the larger smolt tanks.
- Smolt: the 60g parr are grown on in the 12 smolt tanks to 150-250g, at which point they are transferred to sea.
- At Forest Home, the total time taken from egg to sea transfer ranges from 9-15 months. Smolt are then pumped directly into a transfer truck and are driven to Whale Point at Port Huon where they are ongrown before being transferred to sea.

WATER USAGE

Supplied by Danish company Aquatec Solutions, the RAS system is designed for low water usage, with an extensive filtration system that removes nutrients from the water, before circulating back through the fish and eventually to waste.

While water discharge is minimal, all water is treated before leaving the unit, ensuring any waste solids from the system are filtered, dewatered and concentrated prior to site removal. During this process, waste water passes through a denitrification filter, followed by a dephosphorylation process, before being disinfected and finally discharged into farm dams for use as irrigation during the summer months.

This wastewater is treated to Class B wastewater guidelines, utilising flocculation, coagulation, filtration and disinfection. This wastewater is then irrigated across 35.62Ha of organic-standard pasture.

One of the wastewater dams is kept full to operate water cooled chillers for the hatchery, with a second larger overflow dam providing irrigation water for surrounding paddocks. The irrigated farmland is certified as organic, which speaks to the cleanliness of the discharged hatchery water. In addition, the settlement dams have resident platypi and other native animals including water birds.

ENVIRONMENTAL MONITORING

Forest Home operates under an Environmental Licence No. 9915/1 issued by the EPA. This license includes several conditions related to environmental monitoring/testing. These include:

- Noise emission limits including the requirement to undertake a survey as and when directed by the EPA.
- Management of solid waste in accordance with the *Tasmanian Biosolids Reuse Guidelines 1999,* as well as disposal of controlled waste (in accordance with EMPCA).

- Water sampling is conducted onsite monthly during the irrigation period in the warmer months. Annual testing of wastewater is also conducted.
- All wastewater operates to an approved Wastewater Reuse Environmental Management Plan.
- Soil sampling and groundwater sampling is conducted to ensure no build-up of nutrients or salts.
- The site generates an average of 150KL per day of wastewater totalling 54.75ML a year.
- Class A Wastewater treatment is monitored onsite daily.
- Class A Wastewater treatment is monitored monthly by a NATA accredited laboratory.
- All laboratory results are sent monthly to EPA Tasmania.
- The irrigation system is inspected daily (morning and night) to prevent runoff of water.
- Irrigation is conducted between the months October–April, with all water generated across the winter stored within the sites two storage dams for Summer irrigation.

HANDFISH

- Tasmania has three species of handfish—the Spotted, Red and Ziebell's. The Ziebell's handfish is thought to be extinct with the last confirmed sighting taking place in 2007.
- Found only in the Derwent Estuary in Tasmania, there are thought to be fewer than 3000 individuals remaining in the wild (although these numbers may have since declined) and they are considered Critically Endangered.
- Handfish spawn in September and lay between 80-120 eggs.
- A comprehensive Recovery Plan for the three handfish species was released in 2015. This plan built on a number of previous reports and reviews since 1998.
- Handfish face a number of threats to survival including habitat destruction and loss (anchors of vessels easily destroy sensitive habitat), predation by Northern Pacific sea star and sea urchins, poaching to supply illegal aquarium trade, pollution and climate change.
- Handfish have been sighted on several of Huon's leases which indicates that salmon farming does not have an impact on handfish habitat or population.
- Handfish sightings are reported to the State Government and IMAS.

RECOVERY PLAN AND CONSERVATION EFFORTS

The Australian National Recovery Plan (NHRT) for Three Handfish Species (2015) covers the Spotted handfish (*Brachionichthys hirsutus*), Red handfish (*Thymichthys politus*) and Ziebell's handfish (*Brachiopsilus ziebelli*) and considers the conservation requirements of these species across their ranges and identifies the actions to be taken to ensure the species' long-term viability in nature, and the parties that will undertake those actions.

The plan sets out the research and management actions necessary to stop the decline, and support the recovery, of the three handfish species. The objectives are to ensure ecologically functional wild populations of spotted handfish, and to increase understanding of the biology and ecology of Spotted handfish, Red handfish and Ziebell's handfish in order to conserve and contribute to the future recovery of each species.

The NHRT recovery plan has identified the following measures as objectives for conserving handfish species:

- Marine surveys looking for new populations.
    - If Ziebell's handfish were found it would be expected to generate massive global interest.
- Use of cutting-edge technology such as Environmental DNA (eDNA) to improve the efficiency and effectiveness of marine surveys.
    - Presence of handfish species could be identified by the presence of handfish DNA in water samples rather than actual handfish having to be seen by divers in the first instance. Once it

was known from the water sample that handfish were present in the location then diving efforts could be targeted to sites with positive eDNA results.

- Captive breeding to improve the spawning success of the species and provide back-up populations.
- Natural habitat recovery.
- Development and deployment of artificial habitats.

The Handfish Conservation Project was established in 2018 to implement a recovery plan for the three Critically Endangered species of handfish; the Red Handfish, Spotted Handfish, and Ziebell's Handfish.

The project is focused on awareness, citizen science and fundraising, as well as collaboration with the NHRT. The project is currently raising funds through a 'Name a Handfish' campaign and crowdfunding.

Huon supports this project and advocates that increased awareness around the species and their threats will support conservation efforts. Find out more about the project here—https://handfish.org.au/.

Scientists recently celebrated a conservation success when handfish laid hundreds of eggs on artificial habitats (thin ceramic rods) that were made by a local artist and planted in the Derwent. These rods mimic the natural nesting ground of handfish. More information available here—https://www.abc.net.au/news/2018-09-25/celebrations-at-spotted-handfish-artificial-habitat-success/10298020.

JELLYFISH AND SALMON FARMING

- Jellyfish blooms have been occurring globally for hundreds of millions of years and there is no conclusive evidence that jellyfish blooms are increasing in frequency or severity globally, according to peer-reviewed scientific literature involving numerous scientists from multiple countries.
- Moon Jellyfish (*Aurelia aurita*) blooms have been recorded as occurring in Tasmania before salmon farming started in the state.
- Moon Jellyfish blooms occur in some years and not others in south east Tasmania. Gaps of several years with very low to nil Moon Jellyfish occur between significant jellyfish seasons.
- There is no evidence that Moon Jellyfish blooms are occurring with increased frequency or severity in south east Tasmania. The last significant Moon Jellyfish season prior to the 2018/19 summer was the 2012/13 summer.
- There are several theories regarding what environmental factors or combination of factors predispose to serious jellyfish years but there is still much to learn. Huon currently liaises and collaborates with several international jellyfish and environmental DNA experts both in Australia and overseas.
- When certain species of jellyfish bloom internationally, they pose a potential threat to fish farming operations. This can be due to the stinging cells (nematocysts) in the jellyfish tentacles that contain toxins, or the blooms can suffocate fish if large blooms clog nets causing oxygen levels to significantly decrease.
- The Tasmanian industry is no different, which is why Huon monitors the waterways in and around our leases throughout the day daily; both on-water and via in-pen cameras located in every single pen to identify pests and predators including jellyfish.

HISTORY & RESEARCH

Jellyfish blooms have been occurring globally for a very long time; archaeological records show 500-year-old fossils of jellyfish blooms in consecutive layers of the sediments in a quarry in Wisconsin USA. In Tasmania, jellyfish blooms have also been around for a long time with blooms of Moon Jellyfish known to have been occurring before salmon farming even started (over 35 years ago).

There has been some suggestion that jellyfish are present due to climate change, over-fishing, near shore human development (e.g. marinas, boats, jetties, pontoons, aquaculture) and plastic pollution, however, a 2013 article in the Proceedings of the National Academy of Sciences of the USA by Dr Robert Condon, along with 22 co-authors across nine countries, states that, overall, *there has been no significant increase in jellyfish abundance over the period 1874 to 2011* (www.gulfbase.org/people/dr-robert-condon). While the report states there is a weak signal that abundance has increased since 1970, they also state that jellyfish blooms demonstrate a 20-year cycle of increasing and decreasing occurrence globally, so it is not possible to be sure of such a conclusion with confidence.

In the journal *Frontiers in Marine Science* (2018), Professor Kylie Pitt, a recognised jellyfish expert at Griffith University in Queensland, along with several overseas experts concluded that:

"The idea that anthropogenic stressors cause jellyfish blooms appears to have been amplified beyond the evidence provided by primary data. As a research community we should qualify the statements we issue about jellyfish, more critically evaluate and accurately portraying the state of knowledge, both in our scientific papers and in the way we convey our results to the public and policy makers".

Professor Pitt has responded to recent media assertions (2019) about the frequency and severity of jellyfish blooms in Tasmania by saying that, "If there are, indeed, data available to support claims that Moon Jellyfish and other species have increased substantially in areas of salmon operations, then that data should be made available to other scientists. Normally this would be done by publishing them in peer-reviewed scientific literature," (www.catchmenttocoast.org/2018/12/).

TASMANIAN RESEARCH

In 2003, a PhD thesis was released by Dr Simon Wilcox in conjunction with staff at the (then) Tasmanian Aquaculture and Fisheries Institute (now the Institute for Marine and Antarctic Studies – IMAS) and CSIRO. This project was funded collaboratively by the Tasmanian salmon industry and the Australian Research Council (ARC). The central theme of the research was to determine why Moon Jellyfish blooms occur in south east Tasmania in some years and not others. The thesis noted that "*extreme inter-annual variability in the occurrence of jellyfish blooms is a common phenomenon*".

The project found that environmental conditions that correlated with jellyfish abundance include local scale factors such as water temperature, salinity, wind strength, stratification and circulation; and global scale factors such as the southern oscillation index (e.g. El Niño patterns). Again, there are many hypotheses put forward regarding what drives jellyfish blooms, but any proposed worsening of blooms in southern Tasmania is not supported by scientific evidence.

Several jellyfish and jellyfish-like species occur in South East Tasmanian waters. Some species are toxic, and some aren't. Huon Aquaculture is currently, and has always, liaised with several recognised jellyfish and environmental DNA experts on jellyfish related topics both in Australia (from CSIRO, Griffith University, James Cook University) and overseas (from VetAqua International and SINTEF, one of Europe's largest independent research organisations). Communication with these internationally recognised experts increase our understanding of jellyfish issues and provide excellent ongoing opportunities to minimise the impact of jellyfish on our operations now and into the future through research and communication.

MITIGATION OF IMPACTS

To improve staff understanding and minimise the impacts of jellyfish on Huon's salmon operations, Huon Veterinarians have also collated documents on jellyfish and related topics which are also used routinely by staff as a reference on jellyfish matters. Moon Jellyfish tend to be the most common species associated with fish mortality and are most dangerous when they are small enough to fit through the net mesh and contact the fish.

Until they are large enough to remain outside the pens, the most effective way to minimise fish mortality is to get the pen under tow as quickly as possible after a bloom is detected to push the jellyfish to the back, and out of the pen.

LAND-BASED FARMING

- Our $43.7M Whale Point nursery was Australia's first land-based salmon farm facility enabling salmon to grow larger on land before they are transferred to sea.
- Growing our salmon to a larger size on land improves the overall efficiency of our production cycle by reducing the time the salmon spend at sea (from 14 months, to between 9-10 months).
- It is Huon's view that the experience and reliability of completely growing salmon entirely on land (in commercial volumes) is not yet proven.
- We believe a balance of growing our salmon on land and at sea will allow us to stay sustainable in Tasmania and employ more people locally.

LAND-BASED SALMON FARMING

Growing salmon on land before they are transferred to sea has many benefits, primarily the ability to provide a stable environment favourable for best performance, however, farming entirely on land has many drawbacks in terms of the availability of resources, sustainability and questions around eating and flesh quality attributes if taken all the way to harvest.

In addition, in the event that land-based farming became viable, it would make sense to establish these facilities closer to market areas on the mainland. As a proud and fiercely Tasmanian company, we want to avoid moving our assets and employees to the mainland. While we have no intentions to move our operations, Whale Point allows us to continue to gain experience in this new technology which will positively shape the way we farm in the future.

We believe a balance of growing our salmon on land and at sea will allow us to stay sustainable in Tasmania and employ more people locally.

Current drawbacks to farming entirely on land include:

Stocking Density
A pillar of the RSPCA Approved Farming Scheme is to provide conditions where animals can be free to move and express their natural behaviours.

For on land farming to be commercially viable, the salmon would need to be held at high stocking densities to be economically viable. This would be up to 15 times higher than our current maximum sea pen stocking levels (which is 99 per cent water to 1 per cent fish) and could have implications for their health and wellbeing. Due to higher stocking densities, salmon would be unable to exhibit natural behaviours which is contrary to the philosophy that guides our farming.

Fresh Water vs. Salt Water
Salmon have evolved to migrate from freshwater to seawater and as a result, we mimic this in our farming operations. Experience tells us that fish that are grown to harvest in seawater gives an excellent product, and it is not yet fully understood how growing salmon entirely in freshwater will impact both this, and their health and welfare at a larger size.

Theoretically, salmon can be grown on land in saltwater, however, this raises an issue of how to dispose of waste collected within the facility. Current environmental legislation does not permit the disposal of saltwater waste on land, nor can the waste be recycled for fertiliser or compost due to its very high salt content. In addition, the disposal of waste produced by on land salmon farming into the ocean is not permitted in Tasmania.

Electricity

As the water within land-based facilities needs to be constantly moving to provide an optimal environment, a key resource needed for land-based farming is power and running costs are high. Putting aside all the drawbacks, if Huon were to hypothetically farm the equivalent volume of fish on land as we currently have at sea, we would require 40+ Whale Point equivalent facilities and we aren't sure there is enough electricity produced in Tasmania to power these facilities.

Additionally, in a land-based salmon farm, any electrical outages can result in the stock loss of an entire production cycle. The peak biomass that can be held at our Whale Point nursery is the same as a 240 metre pen. There is a very big difference in capital cost of both facilities, the energy used during construction and ongoing operational costs. We believe that future salmon production methods should be seeking to reduce environmental impacts, not increase them.

Salmon Health

As mentioned, there are a lot of unknowns around the implications of growing salmon to harvest size solely in freshwater. What is known, is that land-based farming is riskier as the fish get larger towards harvest size.

Overseas Experience

- Port McNeill, British Columbia – Kuterra, currently producing only 300 tonnes of fish per year https://www.newsdeeply.com/oceans/articles/2017/11/15/fish-out-of-water-interest-in-land-based-aquaculture-grows
- Hirtshals, Denmark – Company Danish Salmon, in 2018 after seven years of losses (max 2.9m Euros in 2015) this land-based fish farmer made a profit, of just Euro 14,000. (www.salmonbusiness.com)
- Pure Salmon – intends to farm on-land (in Japan) when the RAS facility is built. The first harvest is anticipated in 2022 of around 10-20,000 tonnes.

LONNAVALE HATCHERY

- Huon Aquaculture has owned and operated the Lonnavale Hatchery on the Russell River in the Huon River catchment since 2006.
- The site contains two separate aquaculture facilities; the original flow-through facility plus the RAS facility (Recirculation Aquaculture System built by Huon in 2007).
- This site holds a small number of brood stock in seven ponds and four tanks in the flow-through facility, and we hatch and grow salmon in the RAS facility.
- The flow-through tanks are fitted with a drum screen downstream to remove any waste before flowing through two settlement ponds and an extended riffle section (shallow, gravelly stream bed) prior to re-entering the river.
- To ensure there is no irrigation run off from the recirculation unit outflow during the wetter cooler months, the water is stored in dams. In the drier summer months, this water is used to drip-irrigate plantation forest on the surrounding property, Maiden Meadows. Irrigation is controlled by soil moisture sensors and irrigation is conducted according to the EPA approved Wastewater Reuse Environmental Management Plan.
- The operation is regulated by the EPA under Environmental License 7677/2, which prescribes production limits and water quality discharge limits for the flow-through operation.

SITE HISTORY

Our Lonnavale Hatchery is located on the banks of the Russel River, 30 minutes from Huonville. The site is a diversity hotspot, with Huon employees seeing quolls, wallabies, snakes, and platypus daily.

When first purchased by Huon, the site (just flow-through) operated as a salmon and trout grow-out system using a network of outdoor ponds. In 2007, the site's biomass was over 49,000 fish, however, in response to scientific investigation and community consultation, the number of fish held at the site has been significantly reduced to approximately 1,000 fish.

Today, the brood stock are a minor component of the operations at Lonnavale, with the main production taking place within the RAS facility. The RAS facility includes incubation and fish rearing tanks. The eggs are fertilised by hand and held on site in a series of large cylindrical tanks. Eggs are kept at a low temperature until they are ready for hatching, at which time they are moved into trays and the water temperature is raised to encourage their lifecycle to start. We grow the hatched salmon at Lonnavale until they are ready for transfer to sea.

Our Lonnavale facility, environmentally, is our most closely scrutinised and monitored site due to its location at the edge of the Tasmanian wilderness area.

ENVIRONMENTAL MONITORING

Since 2014, an Environmental Protection Notice (EPN) has been in place requiring monthly sampling at seven sites upstream and downstream and below all irrigation operations (at a cost of approx. $50,000 per annum). The sampling sites are:

- 2km upstream of the inlet
- At the site Inlet (in triplicate)
- At the site outlet
- 50 metres downstream from outfall
- 200 metres downstream from outfall
- Lorkins Bridge (below all operations)
- Lorkins Bridge (3km from outfall).

This sampling report includes daily feed, flows, sampling and lab analysis of nutrient levels, river flows and percentage of water diverted and returned. Each week, eight hours of staff time is spent collecting samples. Sampling in this data set is conducted by Huon staff, external consultants and Analytical Services Tasmania staff.

In addition, Huon conducts field samples for pH, DO and temperature, groundwater and soil sampling of the irrigation area twice daily ($20,000 per year). Huon also conducts an irrigation re-use plan every five years ($40,000), as well as undertake macro invertebrate sampling twice annually (as per AusRivas standards - additional $5,000). Plus, river assessments requested by the Government (outside of the current Environmental Licence conditions) take the annual cost of environmental monitoring at the Lonnavale Hatchery to over $110,000.

Analysis of monthly sampling conducted between December 2015 and August 2019 showed that when nutrients are measured to parts per billion (one drop in an Olympic sized swimming pool) there is no difference between 2km upstream of the Huon outfall and 3km downstream of outfall when measured as a median result (https://www.huonaqua.com.au/russell-river-report/.)

Macroinvertebrates
Macroinvertebrate sampling is conducted by an independent consultant, Kanunnah Natural Resources Tasmania, in accordance with AusRivas standard.

The samples were taken from areas known as riffles where possible. A riffle is a shallow section of a stream or river with a rapid current, and a surface broken by gravel, cobble or boulders. A riffle sample is generally preferred, as it produces a larger sample due to the higher amount of available habitat.

AUSRIVAS is a rapid procedure to quantify impact on the in-stream biota. At present, this is achieved by predicting the occurrence of families of macro invertebrates at test sites from environmental variables and a large database of high-quality reference sites. The raw output from this procedure is a list of the families of invertebrates expected in a standard sample from the site, the probability of occurrence of each family in that sample, and a tally of which of those families did occur in an actual sample.

The scores at both sites on the Russell River are very similar, with both sites scoring an either "A" or "X" rating (similar to reference site). There appears to be little impact on macroinvertebrate diversity from the aquaculture operation.

Many highly sensitive invertebrate families have been found above and below the aquaculture facility (table .3). The Lonnavale site scores are similar to pristine bush sites. Any long term environmental degradation would be reflected in changes in species composition and quantity.

Water quality
In 2019, Huon commissioned a review into the water quality between Lonnavale and Lorkins Bridge. The report was conducted by Freshwater Biomonitoring on request of Huon Aquaculture for presentation to the EPA.

Results of this report found that the water downstream from the hatchery is in good condition and the river is well on its way to recovery after the 2018 extreme flood event.

The following points summarize the report:

- The Russell River catchment undergoes substantial change between the upper river and the reach between Lonnavale and Lorkins Bridge. The elevation is reduced, the slope of the river decreases, and flood plains have developed in areas underlain by limestone in the lower catchment. These changes affect the physical environment by reducing water velocities, increasing water temperatures, and providing a greater inflow of groundwater through the alluvial fans and floodplains.
- Flow in the Russell River is variable, with generally higher flows in winter, but episodic high flow events occur year-round. A relatively stable volume of water is extracted from the river for use in the hatchery, equivalent to 30 per cent or less of the Russell River flow for 90 per cent of the time.
- Water quality in the Russell upstream of the Lonnavale Hatchery is characterized by very low nutrient concentrations, low EC and high DO, with most nutrient parameters below the reliable limit of detection.
- The water quality discharged from the Lonnavale Hatchery has a higher concentration of nutrients as compared to the upstream river, however, these are extremely low values just above the limit of detection. The nutrient concentrations are consistently below the discharge limits in the EL, and below the draft Tasmanian WQOs and the ANZECC (2000) guidelines. The evidence based ANZECC (2000) guidelines apply to ambient waters, rather than point source discharges. After mixing in the Russell River, the resulting concentrations are very low compared to these guidelines and likely to pose a low risk to the environment.
- Nutrient concentrations at the water quality monitoring site 50 metres downstream of the outlet (site five) are higher as compared to the upstream sites, but within an additional 200 metres downstream (site six), concentrations are generally equivalent to the sites upstream of the outlet. Concentrations of nitrate + nitrite in the Russell River are lower than found in similar 'clean' headwater streams in Tasmania.
- DRP concentrations show seasonal patterns, with higher concentrations during the summer months when groundwater inputs are relatively high, and a larger proportion of the flow (generally) is directed to the flow-through.
- Nutrient balances between the sites upstream of the Lonnavale Hatchery (sites one and three), the outlet and site five show good agreement, indicating that the nutrient load at site five can be accounted for by the upstream catchment inputs and the hatchery outflow. This strongly suggests there are no substantial fugitive emissions being discharged from the site to the Russell River.
- Nutrient fluxes show that the 80th percentile load from the hatchery is contributing 0.3kg day^{-1} of ammonia, <0.25kg day^{-1} of nitrate + nitrite, about 0.1kg day $^{-1}$ DRP, and 2.5kg day^{-1} of TKN. TKN is composed predominantly of organic nitrogen and is not available for direct uptake by the biota.
- Although very low, the nutrient output from the hatchery, combined with the physical attributes of the river downstream of the hatchery result in an increase in benthic algae at site five relative to the upstream sites. Algal scores of 2.5 or greater, indicative of 50 per cent of the river bed having algal cover, were recorded on five occasions in 2016–2018 at the site. Downstream at site seven, algal scores of 2.5 or greater were recorded on 12 occasions but did not correspond to the patterns at site five. Nutrient concentrations at site seven are lower than those at site five, and generally equivalent to the sites upstream of the hatchery, suggesting that factors other than nutrients are promoting algal growth.
- Benthic chlorophyll-a concentrations exceeded 100mg m^{-2} on one occasion each at sites five and seven, but during different years. The results show weak seasonal trends, but there is no correlation between the sites. The data set is biased to low flows, as only two samples have been collected when rainfall exceeded 10mm in the previous five days. Within this low flow data set, the results ranged from zero, to ~140mg m^{-2}, indicating that factors other than flow contribute to algal growth patterns (e.g. not all low flows result in elevated algae).

- The difference in river substrate between sites five and seven may be responsible for some of the differences between algal growth patterns at the sites. Following very high flow events, benthic algae is greatly reduced or removed at both sites but recovers more rapidly at site seven. This may be due to the widespread occurrence of bedrock at site seven, which is more stable during floods as compared to the predominantly cobble and gravel substrate at site five that gets disturbed during the high flow events. Other factors may include a difference in aspect in the monitoring sites leading to more light penetration at site seven, or the inflow of surface runoff and groundwater from the cleared floodplains contributing micronutrients, such as calcium, iron, magnesium or zinc that promote additional algal growth;
- Benthic algae growth within the Russell River may be aided by the presence of trout, which have been found to increase benthic algal growth relative to streams supporting only galaxiids due to the impact of the different predation patterns on grazers.
- Overall, the water quality and algal results suggest that the discharge from the Lonnavale Hatchery is a contributor to small increases in nutrient concentrations and algal growth at site five, with nutrient concentrations remaining within levels considered to pose low risks with respect to nuisance algae. At site seven, where benthic algal growth is higher, water quality is similar to sites upstream of the hatchery, indicating that factors other than water quality are contributing to the increased growth of algae at the downstream site.

  Russell River Water Quality Review – Lonnavale hatchery to Lorkins Bridge. L Koehnken P/L 2019. Report Prepared for Huon Aquaculture Company and presented to EPA. 45pp.

The full report can be found on Huon's website: https://www.huonaqua.com.au/russell-river-report/.

FARMING AT MACQUARIE HARBOUR

- Salmon farming in Macquarie Harbour (MH) has been controversial in recent years.
- While growing conditions in MH are conducive to low cost salmon production the environment is complex and unpredictable. This means that there must be well controlled and scientifically based production limits if salmonid farming in the Harbour is to be sustainable.
- As early as February 2014, the Tasmanian Salmonid Growers Association (TSGA) established the MH Dissolved Oxygen Working Group (MHDOWG) in response to concerns over an already evident significant declining trend in dissolved oxygen levels in MH.
- Despite the mounting scientific evidence, maximum permissible biomass limits were increased by the regulator, peaking at 20,020 tonnes.

  However, in response to severe deterioration of seabed conditions, marked decline in dissolved oxygen (DO) levels, mass mortality events associated with environmental conditions, and impacts on the World Heritage Area, the regulator subsequently decreased the maximum permissible biomass limit over several decisions back down to 9,500 tonnes.
- The Executive Summary of a Report released by IMAS and CSIRO in July 2019 outlines an apparent stabilisation of environmental conditions within MH. However, it goes on to caution that oxygen levels in the middle and bottom waters of the harbour are still lower than observed historically and have the potential to return to very low levels in spring 2019.
- Over recent months (i.e. spring 2019), Huon's monitoring has shown that DO levels in the water column from 20 metres to 45 metres deep have been consistently below 20 per cent saturation, with some depths being below 10 per cent saturation, and certain depths being at or around 0 per cent saturation. The current situation forewarned in the July report further indicates that the DO levels are far from a certain and sustained recovery in the Harbour.
- The low water exchange characteristics of MH also have relevance to fish health and biosecurity. This must also be an important consideration in determining biomass limits.
- Huon has always maintained a strong commitment to sustainable production in MH as evidenced by a plethora of information available on the public record and the unprecedented action of taking both Federal and State governments to court on this issue.
- Given all the available science, Huon is very pleased to see that the EPA's current biomass limit is back down to 9,500 tonnes and that DO levels hopefully have at least stabilised.
- However, it is also clear from researcher (ie. IMAS and CSIRO) and industry data that environmental conditions are still a long way off recovering to pre-farming conditions.
- It is extremely clear from the experience over recent years that the environment in MH has the potential to severely deteriorate and crash at production biomasses of around 14,000 tonnes so this should never be considered as a sustainable limit in future decisions.

- Biomass limits should not be designed to squeeze every last tonne of production out of MH. To be truly sustainable there must be element of precaution in the biomass limits to acknowledge the well-known complex and unpredictable environment of the Harbour.
- Huon is of the firm view the maximum permissible biomass limit should remain at 9,500 tonnes for a sustained period until environmental conditions have be shown to have fully recovered and that the recovery is sustained.
- It is critical that we learn the lessons from the last few years. This is not only for the sake of sustainable production MH, it is also important for the reputation of both the industry and regulator so that public confidence can be rebuilt.

BACKGROUND OF SALMONID FARMING IN MH

Salmon and trout farming started in MH in the late 1980s. Production steadily increased over the years reaching approx. 9,000 tonnes in 2011. In September 2011 industry sought to increase production in MH, including extending the maximum leasable area from 564 Ha to 926 Ha. As part of this process, biogeochemical and hydrological modelling was used as a guide to determine what a sustainable maximum carrying capacity of farmed salmonids in MH might be expected to be. The modelling at the time indicated this to be 35 tonnes/Ha, which equated to an increase in production from approx. 8,000 tonnes/annum to 29,500 tonnes/annum. Unfortunately, this initial modelling proved to be inaccurate, which is always possible with modelling. However, a failure to recognise this early based on the scientific evidence becoming available led to an unfortunate series of events over several years.

In May 2012, the proposed expansion of lease area in MH was approved by the Tasmanian Government. The proposed expansion was subsequently referred to Australian Government Minister for Environment under the EPBC Act, with a decision received in Oct 2012 that the proposed expansion was "Not a Controlled Action if undertaken in a Particular Manner" (NCAPM), meaning that as long as the activity is undertaken in accordance with the particular manner requirements stipulated by the Federal Government, the proposal did not require further assessment and approval under the EPBC Act.

The Minister's letter stated that the following measures must be undertaken to ensure no significant impacts on Maugean Skate populations or the Tasmanian Wilderness World Heritage Area.

Measures included (but were not limited to):

- Several measures and management actions to prevent substantial benthic visual, physico-chemical or biological changes attributable to marine farming operations at, or extending beyond 35 metres from the boundary of any lease area.
- Several measures and management actions to prevent unacceptable dissolved oxygen (DO) levels.
- The total biomass held across all lease areas must not exceed 52.5 per cent of the modelled maximum sustainable biomass (ie. 15,643 tonnes) until limit levels are reviewed in mid-2013 and must not exceed any such altered levels as may be identified thereafter by the Tasmanian Government.

As early as Feb 2014, the TSGA established the MH Dissolved Oxygen Working Group (MHDOWG) in response to concerns over an already evident significant declining trend in DO levels in MH. The Report of the MHDOWG (Aug 2014) stated among other things that:

- "There is a clear downward trend in the DO levels of the deep-water (> 15m) of MH over the period 2009-present (Aug 2014)".
- "DO levels less than 2 mg/L are now very common below 20 metres, and occasionally come to within 12 metres of the surface".

In Sep 2014 both Huon (and Petuna at the time) strongly asserted to the Tasmanian Government (including DPIPWE) that the existing biomass limit set by the Commonwealth of 52.5 per cent (15,643 tonnes) should be maintained until further information was available to demonstrate increased biomass was sustainable.

Despite this concerning trend in DO, DPIPWE removed the 52.5 per cent (15,643 tonne) biomass limit in October 2014. At the same time, DPIPWE requested information from all three salmon farming companies to support a review of factors important to the sustainability of salmon farming in MH – "DPIPWE MH Status Report".

In Feb 2015, DPIPWE contracted the Cawthron Institute (NZ) to undertake an external review of the MH monitoring program and related research including the "DPIPWE MH Status Report".

Again, despite ongoing concerning trends in DO, DPIPWE wrote to all three companies notifying of its intention to increase the biomass limit to 20,020 tonnes in April 2015.

For much of 2016, DO levels were 0 mg/L or very close to 0 mg/L below 20 metres across large areas of MH.

On 30th November 2016, the EPA advised of their intention to reduce the biomass limits in MH following an assessment of the most recently available scientific data from IMAS.

On 18th January 2017, the EPA released their latest biomass determinations for MH, lowering the maximum permissible biomass to 14,000 tonnes per hectare. The reasons for the reduction in biomass related to the very low DO levels in deeper waters, the extent of the presence of Beggiatoa species in the harbour at that time and its increase over the previous six months, as well as a decline in benthic fauna in the vicinity of the marine farms.

On the 5th May 2017, the EPA advised that the maximum permissible biomass limit of 14,000 tonnes would be reduced to 12,000 tonnes. The reasons for the further reduction related to EPA's assessment of the latest monitoring results provided by the salmon companies, the most recent surveys and research conducted by IMAS, and EPA's analysis of nutrient data for the Harbour over the previous three years and environmental impacts in the World Heritage Area. Specifically, the reasons included among other things that:

- "The January compliance monitoring provided by the companies showed an increase in both the level of non-compliance and the extent of Beggiatoa mats – a key visual indicator at compliance points adjacent to the salmon leases"
- "In relation to additional monitoring by salmon companies and IMAS "Variable results are concerning ... as they show the Harbour is under a level of stress that may not be sustainable in the longer term if current production levels exceed or are maintained at 14,000 tonnes".
- "The EPA's analysis of the available data and potential environmental impacts on the World Heritage Area, suggest we should proceed with precaution".
- "To ensure the environment has the capacity to stabilise and recover to a point where it can sustainably manage the inputs from marine farming, particularly benthic impacts, I believe it necessary to set a maximum limit of 12,000 tonnes for the period of the determination".

On 31st May 2017, the EPA formally reduced the maximum permissible biomass limit to 12,036 tonnes.

On 29th May 2018, the EPA advised that they had further reduced the biomass limit from 12,063 tonnes down to 9,500 tonnes for the following two years, a reduction of 21 per cent. The determination was based on consideration of the current environmental status of MH at the time, of which of which the EPA believed there were several areas of concern, including sub-surface dissolved oxygen conditions.

In July 2019, the FRDC Report, "Environmental Research in Macquarie Harbour", encompassing results from IMAS and CSIRO research was publicly released. The report provided an ongoing update on the status of DO and benthic conditions in MH.

The report states in the Executive Summary:

"Each year since the major deterioration of benthic conditions observed in spring 2016, we have reported improved benthic conditions in the following autumn-winter and a subsequent deterioration during the following spring. This response pattern appears to be well aligned with the decline in oxygen concentrations on middle and bottom waters each spring and subsequent replenishment of oxygen due to oceanic and wind driven recharge through late spring to autumn.

In 2019, the improved benthic conditions compared with previous years is consistent with the less severe decline in DO in the preceding spring of 2018 relative to that observed in spring 2017 and 2016. There may be a trend developing of less severe DO declines in spring each year, which is in turn associated with improved benthic conditions – certainly the signs are encouraging. However, it is important to remember that oxygen levels in the middle and bottom waters of the harbour are still lower than observed historically, and as such, the capacity to return to very low levels in spring remains."

The Report contains a chart that shows the long-term trend in DO within several depth ranges at EPA site 12. Consistent with the Executive Summary above, the DO levels in deeper waters are still clearly lower than those observed historically. While there may be encouraging signs in that the DO may have stabilised to some extent, it is very clear that the DO in deeper waters has not recovered.

In fact, over recent months in late 2019, Huon's monitoring of DO throughout the water column at its leases in MH has shown that DO from 20 metres to 45 metres deep has been consistently less than 20 per cent saturation. Many depths are consistently less than 10 per cent saturation and some at 0 per cent saturation. There is clearly still a very large volume of mid to deep waters in MH with very low DO levels. Once the DO in bottom waters reaches very low levels there is a subsequent potential for large areas of the Harbour to rapidly become anaerobic leading again to wide-scale Beggiatoa mats and death of benthic organisms.

SALMON HEALTH IN MH

It is important that the basis for determining production limits in MH are not limited to environmental considerations, albeit that these are extremely important. The low water exchange characteristics of MH also have relevance to fish health and biosecurity.

Low water exchange means that disease organisms have the capacity to build up within the system, thereby increasing the opportunity for disease spread and outbreaks. The potential consequences of disease in MH have been clearly demonstrated with the recent well-publicised mortality of over 1.3 million salmon due to an outbreak of Pilchard Orthomyxovirus (POMV), and mass mortalities associated with turnover events bringing poorly oxygenated water from depth to the surface and within the confines of the salmon pens. While measures have been undertaken by industry to improve biosecurity around POMV and there are encouraging signs that a newly developed POMV vaccine will be effective, the factors leading to large scale mortality still remain for new or emerging disease issues.

Therefore, production limits need to consider disease epidemiological factors such as population numbers in individual pens and in total across MH, proximity of leases and year classes of fish, and inability to fallow the whole harbour effectively with current stocking regimes.

FUTURE PRODUCTION LIMITS IN MH

Huon has always maintained a strong commitment to sustainable production in MH. There is a plethora of information on the public record to attest to this commitment. Finally, Huon took the unprecedented action of taking both Federal and State governments to court over concerns about production in MH. As a result of this action, there is a large amount of information publicly available through court records for those interested in the details of Huon's efforts over several years to maintain biomass limits at sustainable levels.

Given all the available science, Huon is very pleased to see that the EPA's current maximum permissible biomass limit in MH is back down to 9,500 tonnes and that DO levels hopefully have at least stabilised. However, DO levels have clearly not returned to historical levels and current levels over the spring of 2019 in deeper waters from 20 to 45 metres are still very low, some depths consistently less than 10 per cent saturation and certain depths at 0 per cent saturation.

It is extremely clear from historical experience that the environment in MH has the potential to severely deteriorate and crash at production biomasses of around 14,000 tonnes. Regardless of the reasons this is clearly evident from actual events.

There is often debate about whether the environmental deterioration that has been seen is due to mother nature or salmon farming impacts. The reality is that industry, government and the community have little or no control over mother nature. Therefore, regardless of whether the contribution of salmon farming to environmental deterioration is 10 per cent or 50 per cent, salmon production is one of few factors that can be controlled. Clearly the contribution of salmon farming is on top of all other natural factors and ultimately the straw that has the potential to crash the system over a tipping point.

Therefore, salmon production must be managed at a level that fits within the naturally complex and unpredictable system that is known to be characteristic of MH.

CONCLUSION

Given that environmental parameters like DO are still a long way from recovering to pre-salmon farming conditions and that management of salmon farming production in MH should not be a matter of squeezing every last tonne of production out of the system (i.e.. there should be an element of precaution built into biomass decisions), Huon is of the firm view that the maximum permissible biomass limit in MH should remain at 9,500 tonnes for a sustained period until environmental conditions have been shown to have fully recovered and that the recovery is sustained. It is critical that we learn the lessons from the last few years.

There is still the possibility that production limits may need to be reduced even further, particularly considering the impacts climate change may have on future weather conditions on the West Coast of Tasmania. For example, CSIRO are predicting increased rainfall on the West Coast, increasing river flows. This may have the impact of reducing the number and scale of oceanic influxes of water into MH which are important in recharging the DO levels in deeper waters. See the following link to the CSIRO Report http://tchange.com.au/climate/climate_change.html.

MANAGEMENT OF MARINE DEBRIS

- At Huon we take the responsibility to manage potential and actual marine debris seriously. Eliminating marine debris at the source remains a continual focus.
- Maintaining the integrity of the marine environment and surrounding areas in which we farm is a major factor in the decision-making across the company.
- Operating in extreme weather and high energy sites presents an ongoing challenge to ensure all equipment, ropes and general waste remains secured on our farms.
- Over the past few years, Huon has replaced all moorings, ropes and nets and has designed equipment to reduce the potential for marine debris. Similarly, Huon regularly educates employees, reviews operating procedures and adopts new technology and practices to continue to reduce the potential for marine debris.
- This requires continuous effort including a particular focus post-weather events and collecting marine debris at the request of the community, regardless of source.
- Our workforce is educated on reduction of marine debris and in the rare occasion that an employee is found to be doing the wrong thing, action is taken in the form of formal warnings and/or dismissal.
- We list results of our marine debris clean-ups on our online Sustainability Dashboard.

HUON SPECIFIC ACTIVITIES

Policy and Regulation
We have a marine debris policy which is part of our broader Environmental Management Plan and sits alongside our specific Environmental and Waste Management Plans for each of our farm sites. This is in addition to the company's legal obligations in respect of a variety of State, federal and international legislation and conventions (for both marine and land-based activities).

Huon supported the industry-wide development of a *Code of Practice for the Prevention, Control and Re-use of Marine Debris* to provide guidelines for standard aquaculture practices aligned with the State Government's 'zero tolerance' to marine debris. All waste is stored, handled and disposed of in accordance to the following guidelines:

- Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life;
- Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans;
- DPIPWE Corporate Plan 2018-2022; and the
- International Convention for the Prevention of Pollution from Ships.

The marine farming industry is bound by the *Tasmanian Marine Farming Planning Act 1995*, the Living *Marine Resources Management Act 1995* and the *Environmental Management and Pollution Control Act 1994*.

Under Tasmanian law, the following applies to all marine farm operators:

- There must not be any unauthorised marine farming equipment including any rope, cable or other devices used for securing marine farming equipment, outside of lease areas;
- All equipment on marine leases must be kept in a serviceable condition;
- Any redundant, dilapidated, or loose marine farming structures and equipment must be removed from a lease area at the request of the DPIPWE or MaST; and
- If any part of a marine farming structure or any marine farming equipment break away from the lease area, then it must be recovered as soon as is reasonably possible and returned to the lease area or otherwise disposed of them in an appropriate manner.

Fortress Pens
Over the past few years, Huon has invested more than $90M in our patented Fortress Pens which are in use in some of the roughest farming conditions in the world; Storm Bay. This site is high energy, frequently receiving storms swells and gale force winds and the pens continue to withstand the elements. Our Fortress Pens contain no steel parts to damage boats or chaff through nets and ropes. We also use light-weight, super-strong nets on the pens (made from the same material as bullet-proof vests) which can withstand extremely high current flow.

Shoreline Clean-ups
Huon staff regularly patrol and clean shorelines and beaches across Tasmania and details of each clean up can be found on our Sustainability Dashboard (https://dashboard.huonaqua.com.au/). When we clean up a shoreline we remove everything regardless of whether it is attributable to us. These shorelines are our backyards and we have a responsibility to minimise the impact of our farming on them. We believe that managing and reducing marine debris isn't just an aquaculture issue, but a whole of community issue.

Equipment Branding and Tracking
Huon brands all new equipment (for identification) plus the company is undertaking a process to systematically brand all legacy existing pipes, moorings, buoys etc. We also register all our types of coloured rope with State Government and MaST for easy identification.

We are in the early stages of trialling GPS tracking devices on grid cans moored in the challenging Storm Bay environment and the testing to date is encouraging (the devices are reporting their position regularly and have stayed in situ and given the wave heights in Storm Bay this is a huge achievement). While we do everything we can to prevent equipment becoming loose, tracking devices will ensure that if equipment does stray we know immediately and can identify where the gear's located.

Lease Surveys
At Huon, we conduct environmental monitoring within/underneath our pen bays and leased areas as well as 35 metres beyond the boundary of our leases. We inspect under every pen every 3-4 weeks to proactively manage our sites before any fish-farming impact (including marine debris) requires intervention. This is in addition to baseline surveys (prior to lease stocking) and annual video surveys (provided to the EPA).

Stopping marine debris at the source
A major part of our focus regarding marine debris is stopping it at the source. To do this, our workforce is trained in knot tying which reduces the amount of rope offcuts inadvertently ending up in our waterways. We have also trialled having various bins/collection points on vessels and continue to look for ways to improve our operations. We have recently rolled out rope recycling stations across our Southern operations. These stations provide a collection point for all rope offcuts which are sorted according to what can/can't be recycled.

Equally as important as training and appropriate disposal is awareness. This is why, wherever possible, our employees conduct shoreline clean-ups. A noticeable shift in employee behaviour has been observed after participation in this activity which directly drives positive change.

While the majority of our employees do the right thing, in some cases there are people who don't. Those found to be acting contrary to expected behaviours are cautioned and further breaches may lead to termination of employment.

RESEARCH AND DEVELOPMENT

- Research and development (R&D) into all aspects of Huon's operations has been a cornerstone of our business for over 30 years.
- Through ongoing investment, Huon remain at the forefront of the salmonid farming industry nationally and internationally.
- Salmon Enterprises of Tasmania (SALTAS) funded R&D during the first 10 years of the industry through a 25 per cent levy on the sale of smolt and the operation of a model sea farm at Dover. Research funding exceeded $0.5M annually.
- The R&D undertaken by the salmon industry has resulted in hundreds of published papers in scientific literature, reports and seminar/conference proceedings.
- Huon has spent over $200M on R&D since 2012 alone. Huon has collaborated with over 17 external research providers
- Huon is a member of the Fisheries Research and Development Corporation (FRDC). Through an MOU, the salmon industry was one of few aquaculture and wild fishery industries in Australia that committed its full 0.25 per cent Gross Value of Product (GVP) to research under the Federal Research and Development Corporation system.
- The FRDC and salmonid farming industry have been investing in research on salmon farming since the early 90s.
- The Tasmanian Salmon Aquaculture Industry has been involved in four Cooperative Research Centres (CRCs) since its inception: Aquaculture CRC, Aquafin CRC, Seafood CRC and most recently, the Blue Economy CRC.
- Huon also undertakes internal R&D projects that underpin scientifically-based decision making in our commercial operations, enabling Huon to remain at the leading edge. These include:
    - A dedicated thirty-five trial unit system Hideaway Bay, Dover.
    - Three dedicated trial units (a total of 51 tanks variously capable of holding 0.2g to 15kg size fish) located in Huon freshwater hatchery operations.
- Huon is a one-third partner in the Experimental Aquaculture Facility (EAF) located at Institute for Marine and Antarctic Science's (IMAS) Taroona fisheries and aquaculture research centre. This facility operates 12 x 7,000L tanks and 12 x 2,500L tanks under very controlled environmental conditions.
- Huon has also been a strong supporter and funding contributor to the Centre of Excellence for Aquatic Animal Health and Vaccines located in Launceston. This facility is critical in providing research and development of vaccines and diagnostic tests for the salmon industry.

HUON'S RESEARCH AND DEVELOPMENT

Huon is extremely proud of the advances we've made in the last 30 years; from the way we raise and care

for our fish, to the importance of supply chain management and processing, we have incorporated research into all aspects of our operation.

Our research and development portfolio is diverse and involves collaboration with a large number of external organisations.

Huon has collaborated with all the following organisations:

- CSIRO
- University of Tasmania (UTAS)
- Institute of Marine and Antarctic Studies (IMAS)
- Centre of Excellence for Aquatic Animal Health and Vaccines (Tasmanian DPIPWE)
- University of Queensland
- Griffith University
- James Cook University
- University of Melbourne
- University of Victoria
- Flinders University
- Murdoch University
- Deakin University
- University of Adelaide
- University of Technology Sydney
- University of New Castle
- Port Stephens Fisheries Institute
- Australian Centre for Applied Aquaculture Research

SALMON ENTERPRISES OF TASMANIA (SALTAS)

The Salmon Enterprise of Tasmania (SALTAS) was a cooperative company set up by the Tasmanian government under the Salt-water Salmonid Culture Act 1985. SALTAS was 51 per cent owned by the Tasmanian government and 49 per cent owned by Tasmanian salmon farming companies. SALTAS had a monopoly on the production of smolt for the first ten years of the industry. It also funded R&D during this period through a 25 per cent levy on the sale of smolt and the operation of a model sea farm at Dover.

Research funding exceeded $0.5M per annum and was directed at improving productivity of marine farms in four key areas:

- Propagation
- Health
- Nutrition
- Production systems

SALTAS ran regular scientific and industry meetings and provided a facilitation role beyond their own research program.

Since the end of SALTAS's monopoly on smolt production, there have been several mechanisms by which salmon industry R&D has been promoted, facilitated and managed. These include:

- Tasmanian Salmonid Growers Association (TSGA
- Fisheries Research and Development Corporation (FRDC)
- Four major Cooperative Research Centres (RDCs)
- Extensive internal R&D undertaken by Huon in collaboration with a wide range of R&D providers

TASMANIAN SALMONID GROWERS ASSOCIATION (TSGA)

In 2000, the Tasmanian Salmonid Growers Association (TSGA) appointed its first fulltime Executive Officer. Through a MOU with the Fisheries Research and Development Corporation (FRDC), the salmon industry was one of the few aquaculture or wild fishery industries in Australia that committed its full 0.25 per cent of GVP contribution to research under the Federal Research and Development Corporation system. The MOU aimed to provide greater certainty of the intent in relation to the planning, funding and managing of R&D and the adoption and commercialisation of results.

FISHERIES RESEARCH DEVELOPMENT CORPORATION (FRDC)

The Fisheries Research and Development Corporation (FRDC) is one of 15 Rural Research and Development Corporations (RDCs) covering the main agricultural industries in Australia. RDCs bring industry and researchers together to share funding and develop strategic directions that provide industry with innovative and productive tools to compete in global markets. The Rural Research and Development Corporation model of partnerships between industry and government has been a vital element in the success of Australia's R&D effort.

FRDC is a co-funded partnership between its two stakeholders, the Australian Government and the fishing and aquaculture sectors. It was formed as a statutory corporation in 1991 and is responsible to the Federal Minister of Agriculture and Water Resources.

FRDC's primary revenue source is based on:

- The Australian Government providing unmatched funds equivalent to 0.50 per cent of the average gross value of Australian fisheries and aquaculture production (AGVP) for the current year plus the two preceding years.
- The fishing and aquaculture industry providing contributions
- The Australian Government will then match the amount contributed by industry up to a maximum of 0.25 per cent of the AGVP.

COOPERATIVE RESEARCH CENTRES (CRCS) BACKGROUND

The Commonwealth Government's CRC program supports collaboration between researchers, industries, communities and governments to solve major challenges facing Australia, many of which are global challenges. CRCs commonly have dozens of participating organisations including universities and research institutions, businesses ranging from multinational corporations to small and medium enterprises, governments at national, state and local levels, international partners, not-for-profit organisations and industry and community associations.

The CRC program was officially launched in 1990. Since the commencement of the program in 1991, 200 CRCs have been funded. The Australian Government has committed more than $3.7B in CRC program funding. Participants in CRCs have committed a further $11.7B in cash and in-kind contributions. The total Australian Government support for science, research and innovation in 2012-13 was almost $9B.

THE AQUACULTURE CRC

The Aquaculture CRC started in 1994 and operated for seven years. It was a major research provider to the salmon industry, investing $1.8M in the sector. The CRC supported research projects in five categories:

- Disease identification and control (44 per cent)
- Bio-fouling (28 per cent)
- Product quality and post-handling technology (18 per cent)
- Hatchery (seven per cent)
- Diet development (three per cent)

The Aquaculture CRC had 13 participating research organisations and 19 industry participants. It was exceptional among CRCs at the time for the size and diversity of its network of cooperating researchers. In addition to the formal participants, about 30 other bodies became collaborators in specific research projects. The great majority of these were industry companies and associations.

The Aquaculture CRC promoted cooperation across Australian aquaculture research, provided research opportunities for aquaculture scientists and graduate students, offered access to new technology and expert advice, and delivered the benefits of new technology and research to the aquaculture industry.

The Role of the Aquaculture CRC in Education and Training: Education and training constituted two major objectives of the CRC. The growth of Australian aquaculture requires an increasingly well-trained industry workforce, and researchers with special skills in technologies relevant to aquaculture.

The Aquaculture CRC had a strong program for PhD students, to train young scientists for the aquaculture research community. The CRC offered scholarships for PhD students to carry out work within the scope of the CRC strategic program. It also invited some students, who already had funding from other sources, to join its program. Students were typically involved in large collaborative projects, and this gave them experience of a variety of research environments (and working in the industry). There were opportunities for students to take part in conferences inter-State and overseas, and a range of special training activities, such as research commercialisation and scientific writing.

With six universities involved, as well as many other research institutions and industry locations, the CRC offered a unique range of opportunities to students interested in aquaculture research. Many of the early intake of PhD students are now employed directly in the industry or in continuing research work in aquaculture. Their PhD projects have by no means been academic exercises - most of them have yielded results of commercial significance for the industry.

For more information on the Aquaculture CRC see following link:
https://webarchive.nla.gov.au/awa/20001129130000/http://www.aquacrc.uts.edu.au/about/index.html.

ATLANTIC SALMON AQUACULTURE SUBPROGRAM (ASAS) CRC

In 2000, the FRDC established a managed Atlantic Salmon Aquaculture Subprogram (ASAS) as a vehicle for the MOU between FRDC and the salmon industry. The objectives were to address risks, improve technology transfer and improve industry communication.

The ASAS provided a high level of research service and was able to address key production issues in support of industry's strategic plans. The ASAS provided a service to the Atlantic salmon industry both in Tasmania and the other mainland states. It provided a focal point for a range of other salmonid industry projects and programs in all states.

The ASAS produced a five-year Strategic Plan for the research and development needs of the industry in 2001. Research was broadly categorised into six key areas:

- Health
- Environment
- Nutrition
- Reproduction
- Genetics
- Production

The objectives and performance indicators were listed within these areas over the short, medium and long term. In 2002, the ASAS also contributed to a Strategic Value Management Workshop run by the Department of Economic Development.

The ASAS ran effectively because it developed a good operating framework, including sound communication strategy and well-facilitated meetings, and milestone reporting standards. Key elements of the communication and technology transfer strategy were the Annual Operating Plan, Annual Scientific Conference and Newsletter. The identity and promotion of the Subprogram was further improved through the

establishment of a website. Three issues of the ASAS newsletter (Salmon Snippets), and detailed annual handbooks were produced, and three highly successful scientific conferences, as well as a range of specialist workshops and seminars were held.

THE AQUAFIN CRC

In 2001, the leverage of industry research funding was enhanced through the CRC for Sustainable Aquaculture of Finfish (Aquafin CRC). The Aquafin CRC, contributed an additional $17M in support of the salmon and tuna aquaculture sectors in Australia over seven years. For more details about the Aquafin CRC please visit: https://www.imas.utas.edu.au/__data/assets/pdf_file/0004/743296/AquafinCRC_ProjectNo5-Aquaculture-Subprogram.pdf.

THE SEAFOOD CRC

The Seafood CRC involved 29 participants, investing a total of approx. $140M between 2007 and 2014.

The mission of the Australian Seafood CRC was to assist end-users of its research to deliver safe, high-quality, nutritious Australian seafood products to premium markets - domestically and overseas.

The goal of the Australian Seafood CRC was to double the value of the Australian seafood industry to $4B by 2017 to generate a significant number of new jobs in rural and regional areas.

For more detailed information on the Seafood CRC please visit:
https://www.seafoodcrc.com/salmon/finfish/salmon.html.

THE BLUE ECONOMY CRC

Australia has the third largest Exclusive Economic Zone globally with over 80 per cent being classified as offshore, beyond two nautical miles from the coast and subject to oceanic waves, tidal currents and wind.

The Blue Economy CRC will, for the first time bring the aquaculture and renewable energy sectors together to address the challenges of offshore food and energy production, that leverages the benefits of colocation, vertical integration, infrastructure and shared services. Offshore engineering will be central to this emergence, leveraging decades of experience drawn from the shipping, defense, oil and gas industries.

The Blue Economy CRC will bring together national and international expertise in aquaculture, marine renewable energy and marine engineering as part of a single, collaborative project. Through integration of the knowledge and expertise across these sectors, this CRC will pave the way for innovative, commercially viable and sustainable offshore developments that will see step changes in marine renewable energy output and seafood production.

There are 45 participants across 11 countries contributing over $300M.

Outcomes from the Blue Economy CRC will include:

- Seafood and renewable energy systems that are robust to offshore conditions.
- Commercially viable seafood and energy products for the domestic and export markets.
- Demonstration of the benefits of co-location and integration of the seafood and renewable energy industries.
- Intellectual property, including products and knowledge, for export.
- Future research leaders and a skilled workforce.

Research Program No. 1: Offshore Engineering and Technology
The objective of the Offshore Engineering and Technology program is to generate the infrastructure that supports the development of offshore systems. It brings together industrial engineering expertise to collaborate with the aquaculture (Program 2) and offshore renewable energy (Program 3) sectors to build the required infrastructure for integrated offshore operations.

Research Program No. 2: Seafood and Marine Products
The objective of the Seafood and Marine Products Program is to develop offshore aquaculture systems that provide viable and sustainable growth opportunities for this sector.

Commercialisation opportunities include novel aquaculture system designs for emerging species in collaboration with Program 1, and new seafood products, as well as the development of supply chain aquaculture activities (e.g. platform-based hatcheries and processing). Identification and development of premium export products and new export markets will ensure the expectations of high end-users are met.

Research Program No. 3: Offshore Renewable Energy Systems
The objective of the Offshore Renewable Energy Systems (ORES) program is to support offshore aquaculture (Program 2) through supplies of lower cost energy and ancillary products (oxygen and freshwater) and to contribute to the cost of offshore infrastructure through the development of exportable energy carriers (e.g. hydrogen).

Commercialisation opportunities include the design and development of renewable energy conversion devices; optimal offshore storage solutions and export products and micro-grid architecture solutions and control systems for intelligent management of integrated end-user demands. ORES will also focus on essential resources such as freshwater (via desalination) and oxygen (for hatchery and fish culture) which could be commercialised.

Research Program No. 4: Environment and Ecosystems
The objective of the Environment and Ecosystems (EE) Program is to understand the environmental footprint of the infrastructure (Program 1), culture systems (Program 2) and energy generating devices (Program 3).

The EE program connects with Program 5 to develop management systems to monitor environmental impact and interactions with other sectors, and with programs 1-3 to monitor the impacts of the environment on health, maintenance and performance of species,

infrastructure and devices respectively. Commercialisation opportunities include the development of novel monitoring systems including models and user interfaces to deliver real time data and information for use by government, industry and the public.

Research Program No. 5: Sustainable Offshore Developments
The objective of the Sustainable Offshore Developments program, is to profile and advocate for the regulatory frameworks that will provide confidence for aquaculture and renewable energy industry to invest and for the public to be confident that offshore developments operate to the highest environmental standards for sustainability and ecosystem integrity.

Education and Training
The Blue Economy CRC places heavy emphasis on Education & Training, with an unprecedented scale of research opportunities on offer, including 50 fully-funded Higher Degree by Research PhD scholarships and 50 Postdoctoral Research Fellows appointments across its five research programs.

HDRs and Postdoctoral Research Fellows are expected to present at a national and international conference, co-funded by the CRC and their host institution. The CRC will hold showcase events to communicate CRC research outcomes and provide training opportunities for students, researchers and professionals.

For more details on the Blue Economy CRC please see the following link: https://blueeconomycrc.com.au.

HUON TRIAL FACILITIES

Huon undertakes routine and detailed comparative assessments of commercial pens and fish performance as part of our commercial operations. We also operate several marine and freshwater trial units that enable extensive ongoing testing of research topics (such as health, diet and fish performance). The results from these trials provide a scientifically sound basis for ongoing decision making in commercial operations, enabling Huon to remain at the leading edge of salmon farming expertise and technology.

HUON MARINE TRIAL UNITS

Huon has three dedicated marine trial units located at its Hideaway Bay lease near Dover. These facilities comprise a total of 35 specialised pens.

Round Trial Pen Unit (R Pens)
The R Pens unit consists of 16 x 20 metre circumference pens located within a perimeter predator net and is used for comparing the performance (i.e. growth, feed conversion and health) of commercially available diets. Trials are undertaken in these pens every winter and every summer so are therefore in operation 12 months of the year. These benchmarking trials are undertaken in conjunction with several local and overseas feed companies to ensure Huon is using the best available commercial feeds.

Square Trial Pen Unit (T Pens)
The T Pens unit consists of 18 x 5 metre square pens located within a perimeter predator net and is used for testing feed ingredients or feed formulations that could improve the health and performance of commercially available diets. Trials are undertaken in these pens every winter and every summer so are therefore in operation 12 months of the year. These trials are normally undertaken in conjunction with Huon's major feed supplier to ensure Huon is using the best available commercial feeds.

Selective Breeding Trial Pen Unit
The dedicated trial pen unit at Huon's Hideaway Bay site forms a key facility in the Industry's Selective Breeding Program.

HUON FRESHWATER TRIAL FACILITIES

Huon also has three dedicated trial units in freshwater operations that enable replicated trials to be run in-house in controlled conditions on 0.2g to 15kg fish.

Most trials tend to be run in two main subject areas:

- Diets, feed and feeding, health often in collaborations with feed companies
- Brood stock rearing conditions and how these affect spawning timing and success and subsequent egg production and survival.

Springfield First Feed Trial Unit
The Springfield Hatchery Feed Trial Unit is a freshwater recirculation facility with light, photoperiod, flow and oxygen control. It consists of 15 x 0.25m3 tanks for diet trials. These tanks are suitable for fish from 0.2g to 5.0g.

New Norfolk Trial Unit
The New Norfolk Trial Unit is a freshwater recirculation facility with light, photoperiod, flow and oxygen control. It consists of 4 x 10m3 tanks for brood stock trials suitable for fish from 50g to > 15kg and 12 x 2m3 tanks for diet trials suitable for fish from 20g to 1.0kg.

Bagdad Trial Unit
The Bagdad Trial Unit is a freshwater recirculation facility with light, photoperiod, flow and oxygen control. It consists of 20 x 8m3 tanks for production trials with brood stock. These tanks are suitable for fish from 20g to 15kg.

EXPERIMENTAL AQUACULTURE FACILITY (EAF)

Huon is a partner in the Experimental Aquaculture Facility (EAF), a world class research facility which opened in October 2015. The EAF began as a partnership between Huon Aquaculture, Skretting, the University of Tasmania's Institute for Marine and Antarctic Studies, and the Tasmanian and Australian Governments.

The $6.5M facility is located at Institute for Marine and Antarctic Science's (IMAS) Taroona fisheries and aquaculture research centre and is the first of its kind in the Southern Hemisphere.

The EAF supports collaborative research with the Tasmanian salmon industry on the health and nutrition of Atlantic salmon by directly conducting commercially-relevant research. This research is fundamental to the economic and environmental sustainability of the aquaculture industry in Tasmania, Australia, and internationally.

CENTRE OF EXCELLENCE FOR ANIMAL HEALTH AND VACCINES (CEAAHV)

The Centre of Excellence for Aquatic Animal Health and Vaccines (CEAAHV) is a tri-partite arrangement between the salmon industry, Biosecurity Tasmania of the DPIPWE and FRDC. Each partner derives significant benefit from the CEAAHV activities that they have commissioned. The specialised facilities are the result of co-investment by the three partners in 2013.

Establishment of the CEAAHV was key to meeting the salmon industry's need for solutions to known and new disease threats.

The resources available to the CEAAHV are highly specialised to meet the need for developing bacterial and viral vaccines. The CEAAHV operates a five-room, 60-tank biosecure fish facility, which is used for evaluating prototype vaccines, development of infection challenge models and assessing family lines from the Industry Selective Breeding Program for disease resistance. The laboratory facilities include a dedicated fermenter system for developing prototype vaccines, a tissue culture laboratory, virology laboratory, molecular biology and a general laboratory for development of vaccine antigens and vaccine formulation.

The CEAAHV is staffed by a high-performing group of scientists with unique expertise in salmonid diseases, as well as experience in the development and commercialisation of vaccines for fish diseases. The staff have expertise in bacteriology, virology, vaccinology, molecular biology, protein chemistry, tissue culture, fish husbandry, fish behaviour, recirculation aquaculture systems and quarantine facilities. Importantly the staff have expertise in the development of vaccines, diagnostic tests, commercialisation and knowledge of regulatory requirements. There is no other organisation of its type in Australia.

SEAGRASS BEDS

- Seagrass beds are present and increasing in extent around some of our leases in the Dover/D'Entrecasteaux Channel area where we have farmed for over 30 years.
- The beds are an important habitat for many species.
- The presence of seagrass beds is linked to a variety of environmental conditions including water temperature, flow and nutrient levels. The presence of seagrass beds naturally waxes and wanes.
- As part of our ongoing environmental monitoring program, we regularly survey and monitor seagrass beds around our farms.
- Globally there are 72 species of seagrass with five occurring in Tasmania.
- Seagrass beds can be easily damaged by anchors of vessels which is why our mooring system is placed after a baseline survey and service vessels moor directly to pens.
- If a seagrass bed seen during a Benthic Survey, it is reported to the EPA.
- If a seagrass bed is seen during a Baseline survey, it is reported to the EPA. As beds are generally well-established, their locations are known.
- Aquanel, a local consultancy, occasionally conduct surveys on our behalf. Aquenal is a team of marine and environmental scientists with specialist expertise in the assessment of marine, estuarine and coastal environments.

SEAGRASSES IN TASMANIA

Seagrasses are grass-like plants that have adapted for life underwater in coastal environments. Seagrass communities provide food and shelter for many fish, birds and other animals and are an important part in the marine food web.

Five seagrass species occur in Tasmania, *Amphibolis antarctica*, *Halophila australis*, *Heterozostera tasmanica*, *Posidonia australis* and *Zostera muelleri*, their presence or absence defining five zones around the Tasmanian coast.

Seagrasses are usually found in shallow water and as such, are susceptible to water pollution and temperature fluctuations. In addition, ambient nutrient levels in some coastal water bodies are likely to be a major cause of seagrass decline (Dr Christopher Grant Rees, 1993).

EPIPHYTES AND MONITORING

In areas where nutrients are high, seagrasses can develop thick mats of green slime which are called epiphytes (sessile organisms that grow on plants). Epiphytes of seagrasses include algae (micro and macro), bacteria, fungi, sponges, bryozoans, tunicates, protozoa, hydroids, crustaceans, and mollusks.

Of all of these, algae are the most abundant and diverse group to colonize seagrass leaves. Algal epiphytes significantly contribute to the primary productivity of the ecosystem (20-60 per cent), and form the base of

many food webs within seagrass communities. Algal epiphytes are directly consumed be grazers such as snails and sea slugs. The distribution and abundance of epiphytes is influenced by several factors including light, temperature, water motion, nutrients, seasonal/successional changes as well as grazer/predator interactions.

Since seagrasses are constantly producing new leaves, they are constantly creating new areas for "fouling" organisms to colonize. For most seagrasses, the oldest parts of the plant are the most fouled, which are the oldest leaf and the leaf apexes (tips). These areas contain the highest biomass and diversity of organisms. Eventually the oldest blades, often heavy with epiphytes, are sloughed off by the plant. The load of epiphytes directly affects the amount of light that can reach the leaves of seagrasses. In healthy seagrass ecosystems, epiphyte/grazer/predator interactions help keep the system balanced, but algal epiphytes can become excessive due to nutrient loading and can lead to seagrass die-offs if the plants aren't receiving enough light.

As part of our ongoing environmental monitoring program, we regularly survey and monitor seagrass beds around our farms. Over the past 30 years, we have observed that not only are these beds present but they are also increasing.

SEAGRASS ANATOMY

Much like land grasses, seagrasses have roots, stems and leaves and even produce flowers. The presence of roots and an internal transport system is what differentiates seagrasses from seaweeds.

Chloroplasts in their tissues use the sun's energy to convert carbon dioxide and water into sugar and oxygen for growth through the process of photosynthesis. Veins transport nutrients and water throughout the plant, and have little air pockets called lacunae that help keep the leaves buoyant and exchange oxygen and carbon dioxide throughout the plant.

Like other flowering plants, their roots can absorb nutrients. Unlike flowering plants on land, however, they lack stomata—the tiny pores on leaves that open and close to control water and gas exchange.

Instead, they have a thin cuticle layer, which allows gasses and nutrients to diffuse directly into and out of the leaves from the water. The roots and rhizomes (thicker horizontal stems) of seagrasses extend into the sediment of the seafloor and are used to store and absorb nutrients, as well as anchor the plants (Smithsonian, 2018).

BENEFITS OF SEAGRASSES

Seagrass beds provide an important habitat and food source for many species. In addition, seagrasses are often called foundation plant species or ecosystem engineers because they modify their environments to create unique habitats (Smithsonian, 2018).

They also remove carbon dioxide from the atmosphere, absorb nutrients, slow the flow of the water and stabilize the seafloor. Seagrass beds are the third most valuable habitat in the world, at an estimated $19,000USD per hectare (Costanza et al. 1997).

STORM BAY – OFF SHORE FARMING

- In 2014, Huon completely changed the way we farmed—we shut down our shallowest inshore sites in the Huon River and established new sites in deeper, higher energy areas in Storm Bay.
- Huon operates six farm lease sites in Storm Bay on the Eastern side of Bruny Island, which is located within a Marine Farming Development Plan (MFDP) area. Of the six, we have five active leases, East of Yellow Bluff and four lease areas zoned Storm Bay 1, 2, 3 and 4 (SB1-4). In 2014, Trumpeter Bay was the first active offshore lease although this was decommissioned in late 2019 to allow for better separation between the remaining leases.
- The location of each offshore lease has been determined by the right combination of good water flow, wave action (high energy) and coarse sand sediment on the seafloor, along with community consultation.
- With stringent biosecurity principles applied to the farming area, each farm lease is positioned to maximise the distance between salmon production zones, thereby reducing the risk of disease transfer between year classes in the MFDP area.
- The production limit for Storm Bay is regulated through an industry-wide Total Permissible Dissolved Nitrogen Output (TPDNO), with a combined production limit of approximately 1721.31 tonnes per annum. Huon has 56 per cent of the TPDNO, the remaining ratio is split between Tassal at 28 per cent and Petuna 16 per cent. This limit is determined by the Director of the Environmental Protection Authority (EPA).

FARMING LEASES:

Our **East of Yellow Bluff (EoYB)** lease is approx. 1,200 x 2,200m (260Ha) and currently situated 1.5km offshore. EoYB is regulated by the State Government under Marine Farming Lease Licence 281 to carry out farming in State waters. The associated EPA compliance falls under Environmental Licence 10180.

The primary purpose of the EoYB lease is to stock smolt (our younger fish) which are grown to an average weight around 1.5-2kg. We are currently farming 18 168m pens (so it is currently well below 50 per cent capacity).

The **SB 1- 4 zones** are four 50Ha leases within a total lease area of 200Ha to the south (toward Cape Queen Elizabeth) sited from 1.2 to 1.8km off the Bruny Island. SB zones receive the 1.5-2kg sized fish from EoYB and grow these to harvest. These sites are in deeper water to accommodate the larger 240m pens which are positioned to improve biosecurity through better separation of salmon year-classes. We currently have 18 pens at this site.

SB1-4 is regulated by the State Government under the *Marine Farming Lease Licence 261* to carry out marine farming in State waters.

A very conservative estimate of the area of Storm Bay is 59,860Ha, of which our farming area is 460Ha; less than one per cent.

VESSELS & OFFSHORE ACTIVITY

Huon's wellboats, the Ronja Storm and Ronja Huon, and Huon's feed barges are some of the larger vessels designed to service our offshore sites.

The Ronja Storm is the largest wellboat in the world, both in terms of ship size and water holding capacity; at 116 metres long and 23 metres wide, she has a total water storage volume (including treatment tanks) of over 13,000 cubic metres and holds 800 tonnes of fish at a time (equivalent to an entire 240m Fortress Pen). The Storm also contains an on-board desalination plant that produces 700,000 litres of freshwater every hour by converting seawater; reducing our need to travel to get freshwater.

The *Ronja Storm* will transfer smolt to sea and bath fish at sea with the ability to conduct multiple baths per day. See Fact Sheet – Ronja Storm for more details.

The Ronja Huon is 75 metres long wellboat (with 3,000m³ holding capacity) and will serve as a harvest transfer vessel; whereby fish can be offloaded directly to the harvest facility on-shore, reducing the need to have fish in holding pens and reducing the movement of fish between farming areas (a good biosecurity measure).

Our feed barges are moored, centralised vessels that are remotely controlled from our Hobart office. They have been designed to automatically provide feed to our fish pens (without the need for staff on board) and we currently have three in Storm Bay, with a fourth arriving next year. The Hogan (another world's largest) is a 600T capacity feed barge, approx. 37 metres long x 12 metres wide and is permanently moored within Block 2 of our Farm Lease 261. The Hogan is used to service the larger pens, with its 600T feed silos topped up once every two weeks from vessels such as the Huon Supply. The Hope and Hibbs are 320T feed capacity Barges, approx. 23 metres long and 12 metres wide, moored within our East of Yellow Bluff lease to feed the pens stocked with smolt. The new barge will be another 600T barge servicing Block 1.

Feed barges house high-tech feed systems that use a pellet-recognition system to determine when the fish are hungry and when they are full, which means less wastage and reduced environmental impact. By utilising remote operations Huon is enabled to; feed, inspect nets and other infrastructure, remove mortalities and monitor the environment from shore. They also serve as a weather station, monitor wave/current buoys and capture live video feeds of conditions, ensuring the safety of employees during rough weather.

Over the past few years Huon has invested more than $100M in our patented Fortress Pens, which are in use in some of the roughest farming conditions in the world (Storm Bay). This site is high energy, frequently receiving storms swells and gale force winds and the pens continue to withstand the elements. Our Fortress Pens contain no steel parts to damage boats or chaff through nets and ropes. We also use light-weight, super-strong nets on the pens (made from the same material as bullet-proof vests) which can withstand extremely high current flow.

ENVIRONMENTAL MONITORING

Huon reports to the Environment Protection Authority (EPA) with its Broadscale Environmental Monitoring Program (BEMP est. 2009). This government framework is a localised lease-specific monitoring program developed by the EPA in consultation with the Institute for Marine and Antarctic Studies (IMAS) and Commonwealth Scientific Industry Research Organisation (CSIRO) to monitor key environmental indicators within and adjacent to marine farming lease areas and throughout Storm Bay. This program involves proposal-specific monitoring of water quality and sediment condition geared to production cycles and ongoing broadscale monitoring to assess water quality, sediment condition and reef community structure at intermediate and far-field scales.

Huon's on-farm monitoring includes: water temperature, salinity, dissolved oxygen, ambient phytoplankton and zooplankton, net fouling and marine debris.

The environment surrounding Storm Bay has been extensively studied under FRDC Project 2015-024, of which Huon is a partner.

SUSTAINABLE PRODUCT PACKAGING

- Huon is critically aware of the environmental impact of packaging, and we undertake Sustainable Packaging Guideline (SPG) assessments annually for all product packaging.
- Huon is a signatory of the Australian Packaging Covenant (APC).
- At Huon, we focus on delivering fresh product to the market in a safe, secure and presentable manner. As most of our packaging is in direct contact with our product, it is difficult to incorporate recycled material content in all cases.
- Packaging is developed on an industry-wide basis and we have adopted the industry standard with the focus on safe handling, transportation and retailing of our product.
- Food waste is also a major impact to the environment and by improving product safety by using certain packaging types Huon can assist in reducing waste.

OUR COMMITMENT TO SUSTAINABLE PACKAGING

Huon Aquaculture has been an Australia Packaging Covenant signatory since 2011. The APC is focused on three goals:

- Better design of packaging, both in the process of creating it and the materials used.
- Management of the product after its useful life, i.e. recycling and recovery of materials used in packaging and the packaging manufacturing process.
- Product stewardship – better management of the product during its lifecycle; from those in industry, through to those using the end product.

Major retailers are also committed to reducing waste; there is now a significant drive for all packaging to be 100 per cent recyclable by 2025.

Huon embraces the use of recycled materials in our secondary packaging (e.g. cardboard), which also serves the purpose of delivering our product safely to the market. In addition, we continually work with our packaging suppliers and the APC to ensure that we are ready to implement innovative, eco-friendly packaging as they arise.

Our Modified Atmosphere Packaging (MAP) trays (used for our fresh and hot-smoked portions) comprise of a combination of polyethylene (PET) recycle code '1', and polypropylene (PP) recycle code '5' - the trays are marked with the recycle code on the base.

Unfortunately, not all councils in Australia accept these codes – the attached link outlines local government arrangements across Australia. www.cleanup.org.au/PDF/au/cua_plastic_recycling_fact_sheet.pdf.

MAP PACKAGING

MAP is also referred to as gas flushing, protective atmosphere packaging or reduced oxygen packaging.

There are many benefits of MAP packaging, the most notable being its ability to extend the shelf life of fresh products to between 12-14 days (dependent on size). By comparison, a fresh 'behind the glass' portion may only have a few days' shelf life once it is open and exposed to the air (not to mention the handling). In short, more shelf life = less food wastage. In addition, the MAP environment enables extended shelf life without requiring the addition of chemical preservatives or stabilisers, ensuring natural products stay natural from farmer to consumer.

In 2019, MAP packaging is the preferred packaging of choice for consumers. Not only does this format extend the shelf life of fresh products, it also clearly states the date the product was packed, and when it needs to be consumed by. For Huon, MAP packaging means we can offer customers set portion weights (great for dieting and portion control) and pre-flavoured or marinated products in a mess-free package. It also provides the surface area to list the nutritional information of the product, as well as popular recipe ideas.

In the minds of consumers, biosecurity and food-safety has never been more important when choosing seafood products. MAP packaging provides the peace of mind that no one outside of Huon's processing facility has touched the product, and the transparent window into the package allows people to choose the product they want down to the individual portion.

MOVING FORWARD

As a member of APC, Huon is committed to their Clear National Packaging Targets.

In 2018, the National Packaging Targets were created to map a new sustainable pathway for packaging in Australia by 2025, they include:

- 100 per cent reusable, recyclable or compostable packaging.
- 70 per cent of plastic packaging being recycled or composted.
- 30 per cent of average recycled content included in packaging.
- The phase-out of problematic and unnecessary single-use plastics packaging.

For our APC obligations, Huon utilise the services of Environmental Compliance Solutions (ECS) to ensure we meet our compliance targets as highlighted above.

In addition to our APC compliance targets, Huon have started several projects that will increase the sustainability of our packaging. These include:

- Product innovation – streamlining our product lines and standardising our packaging (resulting in less waste).
- Poly trials – phasing out poly boxes.
- Phase out absorbent pads in MAP trays (the absorbent pad is single use plastic and cannot be recycled).

RONJA STORM

- The Ronja Storm is Huon's second wellboat and is leased to the company for a period of 10 years.
- It is named after Storm Bay; the area where she will primarily operate.
- The Ronja Storm is the largest wellboat in the world, both in terms of ship size and water holding capacity; at 116 metres long and 23 metres wide.
- An on-board desalination plant will produce 700,000 litres of freshwater every hour, reducing our use of Tasmania's freshwater resource.

THE RONJA STORM

The Ronja Storm is a highly sophisticated wellboat designed to withstand the world's roughest salmon farming area, Storm Bay, which is why she is named after the challenging waters where she will operate.

The Ronja Storm is the largest wellboat in the world, both in terms of ship size and water holding capacity; at 116 metres long and 23 metres wide, she has a total water storage volume (including treatment tanks) of over 13,000 cubic metres (4 at 1780 m3) and holds 800 tonnes of fish at a time (equivalent to an entire 240 metre Fortress Pen). Every well has 30 sensors installed which deliver constant, real-time monitoring data back to the bridge. Her well capacity is more than treble that of the Ronja Huon (3 at 1,000 m3).

She also contains an on-board desalination plant that produces 700,000 litres of freshwater every hour, reducing our use of Tasmania's freshwater resource.

While Ronja Storm will be able to work in more difficult conditions than Ronja Huon, its large capacity and ability to produce freshwater on-board means it can do considerably more work when conditions are fine and easier for farm crews. This will also result in less vessel movements through the Channel.

The arrival of the Ronja Storm will allow the Ronja Huon to be used primarily for harvest and as a back-up wellboat. Dedicating the Ronja Huon as a harvest transfer vessel allows for better biosecurity as it reduces the need for holding pens. Depending upon the situation, all water used for harvesting will be retained on Ronja Huon for disinfection and release, or transport back to the site of origin for release.

The Ronja Storm is an investment into Huon's future into farming in Tasmania, and Australia as a whole. She enables expansion in offshore, more challenging farming environments, enables strengthened animal welfare and biosecurity practices.

Her innovative technology does not equate to reduced employment; in fact, we have employed additional staff.

THE PARTICULARS

The ship was designed by Havyard Ship Design with significant input into the fish handling systems provided by both Solvtrans (ship builders) and Huon Aquaculture.

The hull, superstructure and large pipework was purpose-built at the Cemre shipyard in Turkey. The bare ship was then towed to Havyard's shipyard at Leirvik on Sognefjord in Norway for the comprehensive fit out.

Sea trials were undertaken in late October followed by dry-docking where the hull was thoroughly pressure cleaned in preparation for application of an additional anti-fouling paint (that only requires repainting every five years). Throughout this process an independent marine consultant assessed the steps undertaken.

She will then make her way to Tasmania via the Canary Islands and the Panama Canal, travelling across the Pacific Ocean (with a refuel stop in Tahiti!). This means the hull will be exposed to freshwater during the transit through the canal, which is a good biosecurity practice. Once she arrives in Hobart rigorous customs and immigration protocols will be undertaken.

She will always contain freshwater ballast (generated from RO) which will be certified upon arrival through Federal Department of Environment, and any discharge will be in accordance with the Commonwealth Biofouling Management Guidelines.

The Ronja Storm has an adjustable live fish grader in the loading system that allows for removal of small fish which can be returned to sea alive.

The Ronja Storm is fitted with the latest power system which utilises multiple variable speed generators which adjust the number of units in operation as well as engine speed, to meet required power demand. This is achieved by generating power at 690VAC with variable frequency and converting it to DC inside the main switchboard, and transmitting it through the ship using 1,000VDC and 700VDC grids. Electrical power is then converted back to the required AC voltage by frequency converters which control electric motor speed. As a result, the system achieves a significant reduction in fuel consumption, and noise and exhaust emissions.

Ronja Storm's power generation and propulsion system is designed to operate at a maximum sound pressure of 35 decibels (dB) which is a reduction of 90 per cent when compared to Ronja Huon's designed noise pressure of 45dB (the Bel scale is logarithmic so an increase of 10dB increases sound pressure by 10 times, and increase of 20dB increases it by 100 times). To compare this with some common household white goods, the quietest dishwasher available produces 40dB and an average domestic refrigerator produces 45dB.

The technology is more robust than ever—this is the first time this type of offshore power management system has been fitted to a wellboat. She includes backup power systems that ensure a minimum of 50 per cent operations in case of system failure resulting in robust, secure fish welfare practices.

DESALINATION PLANT

The Ronja Storm has the capability to create freshwater from seawater via reverse osmosis through an on-water desalination plant (which can produce 16.8ML of freshwater per day; or over 200,000 average sized baths for humans). Water is taken into the vessel from the sea and turned into freshwater. In addition, the water can be used up to 12 times before being treated and returned to sea (while that is possible, our processes include an inspection of water quality after four uses). Water in the tanks can be re-used multiple times by adding clean freshwater to the tanks at a rate of 10 per cent per hour.

Of each intake of sea water, 50 per cent is turned into freshwater for bathing and the other 50 per cent is cleaned (following filtration) and released back into the ocean with the additional salt and mineral content from the treated seawater. This water produced by reverse osmosis (RO) is of a higher quality than water from a freshwater river, meaning a greater density of fish is able to be treated at any given time. All water used in the RO process is filtered in a three-stage process down to a particle size of five microns.

Some people have expressed concern to us at the level of "pollutants" being discharged back into the sea from the desalination plant; the only pollutants returned to salt water is salt water, and sea water will always be returned to the same lease site.

WHALE POINT SALMON NURSERY

- Our $43.7M Whale Point Salmon Nursery is an Australian first; a land-based facility that enables us to grow salmon larger on land before putting them to sea.
- By growing our salmon to a larger size on land, we improve the efficiency of our overall production cycle by reducing the time they spend at sea (from 14 months, to between 9-10 months). This allows us to better manage our existing leases at sea, enabling for longer fallow periods between stocking, separation of year classes—all of which delivers biosecurity and environmental benefits.
- Construction of the nursery at Whale Point in Port Huon began in mid-2017. The facility was completed in February 2019, at which point the first intake of 300,000 juvenile salmon were transferred from Huon's state-of-the-art Forest Home hatchery.
- The largest land-grown salmon in the Southern Hemisphere were transferred to sea in early July 2019. Approximately 140,000 1kg+ salmon were transferred to pens in the Huon and D'Entrecasteaux Channel and will remain there until harvest in March/April 2020.
- Huon is world-leading in its waste management treatment systems installed at Whale Point.

THE SALMON NURSERY

Our Whale Point Salmon Nursery is located at Port Huon, in the Huon Valley. The site for the nursery was chosen as it has access to two water sources, is close to a reliable power supply, and has no direct neighbours. It is also close enough to the sea to allow direct discharge straight down a pipe into the wellboat for sea transfers. Whale Point was also selected as a proactive way to rehabilitate the site due to previous industrial activity.

Rehabilitation of Whale Point was required as the site was home to the APM/Amcor pulp mill, which employed 170 people at its peak (in the 1970s) before being decommissioned in 1991. This process was undertaken in consultation with Tasmania's Environmental Protection Authority (EPA).

The facility has 12 circular 16 metre diameter, 4 metre deep (800m3) grow-out tanks and four smaller grading tanks at 220m3. There is also an on-site dam for operating water-cooled chillers, as well as employee parking.

During the construction phase, 200 direct and indirect (mostly) local jobs were created, with only a few specialised contractors coming from interstate and overseas.

The facility uses world-leading water recirculation technology that enables 98 per cent of the freshwater to be repeatedly treated and re-used twice every hour. The remaining two per cent of water has the solids removed (through a flocculation process which separates solid and liquid particles; first through a belt filter and then centrifuge) for inclusion into compost. During this process, the nutrients are removed, and the remaining water is sterilised. This water is then reused to bathe fish at sea in the wellboat.

Organic waste produced in the nursery fluctuates across the year depending on the total biomass of smolt within, and consequently, the level of production:

- Fish arrive in November ranging from 15g to 40g. By late March/early April, the fish have grown to around 250g, and to 500g by May. During March through to June, the site is at full capacity with peak biomass and maximum production.
- Biomass builds up again with a secondary peak in September, at which time the last cohort for the year is transferred to sea.

WASTE MANAGEMENT SYSTEM

Within the fish holding system, the primary excretory products as the fish grow are faeces, nitrogen compounds and CO2. These all require removal before the water can be reused.

The first step is the removal of faeces by drum screens. These are situated close to the fish outlets and take most of the faeces before the next removal step. The second step involves nitrogen conversion by running the water through biofilters featuring good bacteria. Good bacteria help to keep the system balanced, and for this reason, we will never use antibiotics at Whale Point (because they would destroy the good bacteria as well as the bad).

To mitigate against the need for antibiotics, we have very strong biosecurity measures and fish husbandry practices in place. After the biofilters, the water is then ozonated. This further breaks down the nitrogen compounds, as well as clarifies and disinfects the water that then flows into the degassers which removes the CO2. Finally, oxygen is injected, and the clean water is returned to the fish.

The waste products that are sent to the waste treatment area are the resultant sludge from the faeces and biofilter by-products. There are 20 aerobic biofilters that get cleaned once every four weeks.

Once in the waste treatment, the sludge is flocculated to remove it from the water. Much of the water is removed by passing the sludge through a belt filter and a centrifuge. Dirty water associated with the sludge goes through six bacterial denitrification filters that reduce the nitrogen in the system by turning it into a gas and releasing it into the air (air is 80 per cent nitrogen).

This process also removes any phosphorus from the water and incorporates it into the sludge. At this stage, the sludge is the consistency of putty and is taken away to be used in compost. The water then passes through more biofilters to remove any nitrogen that has leaked into the water from the sludge. It is then disinfected with ozone before the very clean, clear water is discharged into an enclosed dam. Water from the dam is then drawn down into our wellboat for bathing our fish at sea.

As this system is so effective, the water within the hatchery can be treated and reused again and again, reducing our reliance on Tasmania's freshwater supply. What waste is produced is all reused.

ENVIRONMENTAL MONITORING

Whale Point operates under an Environmental Licence No. 10296 issued by the EPA. This license includes several conditions related to environmental monitoring/testing. These include:

- Groundwater testing quarterly and a report submitted to the EPA.
- Surface water testing at three locations across the site when more than 20 millimetres of rainfall occurs.
- Odour monitoring (first report due in March 2020).
- Noise sampling (completed in May 2019) – which demonstrated that the site was fully compliant with permit requirements regarding noise, and that overall noise levels at the site decreased between the initial planning stages in July 2017 and when it became fully operational (during the May 2019 testing). More information regarding our noise sampling at Whale Point is available here - www.huonaqua.com.au/whale-point-salmon-nursery-huons-quiet-achiever/.

WILDLIFE INTERACTIONS

- Like all farming operations we work hard to keep both our fish as well as the local wildlife safe. We believe the solution to this is good barrier technology and our industry-leading Fortress Pens and nets protect seals and birds by restricting access to the pens above and below the water line.
- Seals are one of the oceans natural inhabitants and we have a responsibility to minimise any impact we have on them. The best way to protect them and keep them safe is by preventing them from entering our pens in the first place.
- Seals are very intelligent and naturally curious. Before the Fortress Pens were implemented, the seals could see the fish through the nest so it was commonplace for seals to climb up the above-water pen wall to gain entry. They were also known to ram the nets in an attempt to create a hole to swim through (and bearing in mind that male seals can weigh upwards of 500kg they can create big holes!).
- We report all wildlife and predator interactions to relevant authorities and release regular updates via our Sustainability Dashboard.
- Huon has a dedicated Wildlife team who actively work to minimise animal interactions on our farms. This team spend a lot of time checking equipment and pens making sure everything is maintained to a high standard.
- Huon also works closely with the RSPCA in relation to protecting the welfare of both the stock and native wildlife. This relationship was instrumental in Huon ceasing to use some types of seal deterrents (bean bags and scare caps).

SEALS

Thirty-five species of seals inhabit the world's oceans, of which, two breed in Tasmanian waters—the Australian fur seal and Long-nosed fur seal. Other seals that may occasionally be seen in Tasmania's waters include the Southern elephant seal, Leopard seal, Sub-Antarctic fur seal and 'true' seals. Commercial harvesting of seals was commonplace in Tasmania from 1798-1830's which drove seals to the brink. Banning of this practice has allowed the seal population to naturally increase.

Seals are a natural marine predator, and as we share our waterways with them we are mindful of their safety as well as the safety of our fish and staff. Our patented Fortress Pens (Huon has so far invested around $100M) aim to prevent seals from entering our pens to eat or attack the salmon, which means that less chance of them becoming trapped. The nets are made from Dyneema, the same material used in bullet-proof vests, and are the strongest developed and used in fish farming worldwide. The pen design hinders easy access by seals to the walkways, reducing the likelihood of aggressive seals interacting with employees.

One of the key features of the Fortress Pens is a patented, wide-style stanchion with flexible seal fence posts in an angled socket to allow an outer predator net to be set around the inner net while keeping a two metre and seven metre separation between the nets. This outer predator net is connected directly to the

sinker tube to reduce rigging and keep it tensioned at all times and in all weather; in essence it provides a barrier to keep predators away from the fish.

Our Fortress Pens were instrumental in Huon being able to cease relocating seals in August 2016, more than a year before the State Government banned the practice (September 2017).

An updated Seal Management Framework was rolled out in 2018 which outlines the approved measures to manage seal interactions and sets out standards for wildlife exclusion from fish pens. This framework was a collaboration between the Tasmanian Government and industry. The framework can be found here: https://dpipwe.tas.gov.au/Documents/Seal%20Management%20Framework.pdf

Our use of seal deterrents has significantly reduced in 2019. We are continually working with our stakeholders to improve our farming operations. From January to 30 June 2019, we used zero bean bags, zero scare caps and our use of scare crackers was around 15 per cent of total industry usage. Details around deterrent use is publically available here:

https://dpipwe.tas.gov.au/Documents/RTI%20010%20-2019-20%20%28Stage%201%29.p

Data on our seal interactions can be found on our Sustainability Dashboard.

BIRDS

In the minds of sea and coastal birds, salmon farms are an attractive place to perch and source food—both the fish and the fish-feed. The birds commonly found at our farms include cormorants (black-faced, great and pied), seagulls (Pacific, silver and kelp), eagles (mostly sea but occasionally wedge-tailed), and the occasional penguin, petrel and short-tailed shearwater.

Preventing birds from becoming entangled or drowning inside our pens is a high priority for Huon. In fact, preventing bird interactions was a driver in the development of our Fortress Pens. Designed in-house by Huon staff, the pens have customised nets and barriers developed to avoid bird entries and entanglement. The Fortress Pen net designs include higher, more taught nets, differing mesh sizes and net weights (depending on where the net is located on the pen), and diamond shaped net holes (to increase stress capability). All these features are designed to prevent net holes and bird entries/entanglements while staying well above the water to ensure birds can't access the water through the nets.

By denying birds the opportunity to perch and access to both fish and feed, they are discouraged from viewing our pens as a place to rest and as a source of food. Additionally, limiting the bird interactions at our Fortress Pens has further safeguarded the health and wellbeing of our fish, ensuring they don't get stressed, or worse, killed.

In the unlikely event a bird enters a Fortress Pen, we have installed custom-designed escape hatches to ensure birds are not trapped. The innovative escape hatches feature a perching bar (to attract birds) and a one-way bird-sized hatch that guarantees a bird cannot re-enter once it has gone through the gridded hatch.

Up-to-date data on our bird interactions can be found on our Sustainability Dashboard.