



LAND-BASED SALMON FARMING

- We believe that a balance of growing our salmon on land and at sea will allow us to continue to farm sustainably and employ more local people. It is Huon's view that the experience and reliability of completely growing salmon entirely on land (in commercial volumes) is not yet proven nor is there a likelihood of 100% land-based salmon farming in Tasmania for a range of reasons including:
 - Tasmanian legislation does not allow the discharge of saltwater waste onto land OR the ocean and ideally salmon need to spend part of their lifecycle in saltwater, so this restricts how long they can be farmed on land.
 - The natural resources (land, electricity and water) required to house enough facilities to hypothetically cease sea-based operations is not feasible nor is it financially viable. If Huon were to hypothetically farm the equivalent volume of fish on land as we currently have at sea, we would require at least 40 additional Whale Point facilities (based on 2021 production tonnage from WP vs marine leases). In 2018-19 Tasmania was a net exporter of 505GWh of energy. It is estimated that 640GWh would be required to produce on land the same volume – 80,000 tonnes – produced by the industry; this figure does not factor in the fact that marine based farming stock densities are between 4-5 times lower than land based farming).
 - IF land-based salmon farming became commercially viable it would make sense to establish these facilities closer to market areas on the mainland. We want to keep Tasmanians employed in Tasmania.
- 100% land-based salmon farming is not successfully happening (in commercial volumes) in any country in the world. The world's largest producer of salmon, Norway, is just taking tentative steps into the world of land-based farming.
- So, is Huon doing anything to explore land-based farming?
- Huon Aquaculture's \$43.7M Whale Point nursery, which commenced operations more than two years ago, is Australia's first land-based salmon farming facility and enables fish to be grown larger on land before they are transferred to sea. This facility improves the efficiency of our production cycle by reducing the time the salmon can spend at sea (from 14 months, to between 9-10 months). This also enables marine lease sites to be fallowed for longer.
- For this debate to be balanced, consideration also needs to be given to the conversion of terrestrial land to livestock farming, which is less sustainable than salmon farming due to higher feed conversion ratios which also generate higher carbon footprints. How much native bushland has been cleared for agriculture compared to the size of aquaculture farms? All farming has an impact, including aquaculture, but when compared to the impacts of terrestrial farming (land clearing, emissions, run off etc) aquaculture wins the sustainability argument, and ultimately the growing global population has to eat!



LAND-BASED DRAWBACKS

Location:

In the event that 100% land-based salmon farming becomes commercially viable, it would make sense to establish these facilities closer to market areas on the mainland. Our Whale Point nursery allows us to continue to gain experience in this new technology and provides a balance of growing our salmon on land and at sea which will allow us to continue to farm sustainably in Tasmania and employ more people locally.

Land-based facilities would only require around 10% of the current workforce (thereby rendering people unemployed in addition to the loss of a range of other jobs which exist to supply and contract to the Tasmanian salmon industry).

Fish Health:

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

Salmon have evolved to migrate from freshwater to seawater and as a result, we mimic this in our farming operations. In addition, maintaining salmon in freshwater for their entire lifecycle would not be in accordance with RSPCA fundamental welfare requirements (ie this limitation could be compared with not allowing nesting boxes for chickens). Plus, for land-based salmon farming to be commercially viable, the salmon would need to be held at high stocking densities. This would be up to 4-5 times higher than our current maximum sea pen stocking levels (which is maximum 99% water to 1% 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.

In addition, while in theory less pharmaceuticals are required for land-based systems (no external pathogens) if fish did get sick, disease can spread faster and require the entire stock population to be treated.

PETA (People for the Ethical Treatment of Animals) is pursuing legal action against Norwegian land based farmer, Atlantic Sapphire (its Miami facility) and Nordic Aquafarms for cruelty because of its concerns about high stocking density rates.

Waste Disposal:

Waste is still generated in a land-based system – just in the form of salt-water waste which is more concentrated and therefore harder to repurpose.

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 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. Nor does current legislation permit the disposal of saltwater waste into the ocean. This would mean a halt to Huon's existing program whereby every year we recycle hundreds of tonnes of the fish poo from our freshwater facilities into compost for local farmers.

HOWEVER, current Tasmanian legislation does not permit the disposal of saltwater waste on land OR into the ocean, so 100% land-based farming which adheres to best practice fish welfare practices is NOT POSSIBLE.

Energy Inputs:

As the water within land-based facilities needs to be constantly moving to provide an optimal environment (ie lighting, heating, water flow and filtration) a key resource needed for land-based farming is power. Putting aside all the above barriers, if Huon were to hypothetically farm the equivalent volume of fish on land as we currently have at sea, we would require at least 40 Whale Point-equivalent facilities and we question whether there is sufficient available electricity in Tasmania (not exported) to power these facilities. (In 2018-19 Tasmanian was a net exporter of 505GWh of energy. It is estimated that 640GWh would be required to



produce on land the same volume – 80,000 tonnes – produced by the industry; this figure does not factor in the fact that marine based farming stock densities are between 4-5 times lower than land based farming).

Additionally, in a land-based salmon farm, any electrical outages can result in the stock loss of an entire production cycle (which has already happened for Atlantic Sapphire in Miami).

GLOBAL ATTENTION

Even using aggressive growth estimates, industry analysts estimate that total current production from land based is estimated at between 20,000-30,000 tonnes (in 2021; ie less than 0.01% of total production). Plus, the majority of fish currently grown-out in RAS are small sized (less than 3kgs) whereas most markets, particularly international customers, require fish of 5kgs or larger.

In 2020, many countries commenced building new land-based facilities and as at January 2022 the first harvests were imminent – the test will be if these facilities can farm commercially viable quantities while still meeting environmental requirements as well as the requirements of customer tastebuds (land-based facilities can face muddy or earthy flavour issues known as 'off-flavour' caused by metabolites released by microbes that grow within the land-based systems). Russian company, Aquaproduct claims it will begin operating the country's first land-based RAS facility by end of Q1 2022. The company previously said it planned to produce 2,125 metric tons of HOG farmed salmon per year, starting in 2022.

Even the world's biggest producer of salmon, Norway, is only just taking small, tentative steps into the world of land-based farming:

- In FY20-21, Nordic Aquafarms' pilot plant in Fredrikstad (the first land-based facility in Norway) produced 620 tonnes and employed 15 people. The maximum output of the facility is 1,500 tonnes. (In comparison, in 2020, the country produced 1.369 MILLION tonnes of salmon as per The Salmon Farming Industry in Norway 2021 Report). In January 2022, the company signalled intention to move away from land-based salmon production. [Norway's first land-based salmon facility is considering ditching salmon](#)
- Norwegian company, Salmon Evolution is due to harvest its first land-based salmon in Q1 2022.
- In the USA, Atlantic Sapphire harvested its first 166 metric tonnes HOG from its Miami facility in 2020 (compared with Huon's 25,566 tonnes). In March 2021, Atlantic Sapphire lost 500 tonnes of fish (at the Miami site) [Atlantic Sapphire mortality](#). In July 2021, Atlantic Sapphire reported a further 400 tonnes loss from its Danish site [Atlantic Sapphire expects 3 million hit](#). In August 2021, the company, announced that it had suffered a net loss of USD 51.5 million in the first six months of 2021, with the company valued at \$1 billion less than it had been 6 months earlier. Then a month later, a fire broke out at the Danish facility and all fish stock were [lost](#). From a retail/sales perspective, consumers haven't embraced land-based farmed salmon – Oct 2021 - ['It wasn't selling': Atlantic Sapphire's land-based salmon dropped from key retailer | Intrafish](#)

