



FRESHWATER IMPROVEMENT PROGRAMME (FIP) - INPUTS

- To continue to grow responsibly and remain at the forefront of our industry we must constantly improve; a strong example is our voluntary Freshwater Improvement Programme (FIP).
- There is no empirical evidence that water quality has been adversely affected downstream of ANY of Huon Aquaculture's freshwater facilities, which are located at nine separate locations in regional Tasmania.
- However, to ensure this continues, in 2019, we voluntarily implemented a FIP to measure the level of various inputs on a monthly basis at all of our sites, with annual results reported to the EPA and published on our website.
- Each measured input has the potential to negatively impact waterways, which is why we are so vigilant in ensuring that waterways in the vicinity of our freshwater operations are closely monitored.
- You can read more about the FIP here <https://www.huonaqua.com.au/our-approach/our-operations/freshwater-operations/>

FRESHWATER IMPROVEMENT PROGRAMME

- The FIP delivers uniformity of operational requirements across sites but more importantly places a cap on discharge limits and site biomass capacities, to reduce the potential for any adverse environmental impacts.
- The data collected continues 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.



INPUTS EXPLAINED – TOTAL NITROGEN

Nitrogen is an essential nutrient for plants and animals, and is the reason why gardeners love chicken manure, blood and bone and fish-based compost, but excess nitrogen can have a detrimental effect on waterways.

Excess nitrogen can cause an overabundance of algae to develop (often called an algal bloom), which, in turn, lowers the amount of oxygen in the water. Plant and animal life cannot survive if oxygen levels in the water become too low.

Huon's FIP analysis allows the company and regulators to fully understand the actual impact of our sites on a receiving waterway.

For example, from our analysis of the River Derwent, we know that in 2020 over 1372 kilograms of Total Nitrogen passed our Meadowbank Hatchery from upstream sources each day,

Meadowbank's addition to the Total Nitrogen load within the River Derwent was 2.2% of the annual total, and this site is upstream of the major Derwent River inputs, such as wastewater treatment plants.

All Huon freshwater sites analytically measure Total Nitrogen levels monthly within their discharge.

TOTAL AMMONIA

Ammonia is a form of nitrogen – bacteria that occurs naturally in water can convert ammonia to nitrite and nitrate, which can then be used by plants to promote growth and improve fruit and seed production.

However, ammonia can, when water pH is high, be extremely harmful to aquatic life and is therefore a critical measurement within environmental sampling programmes.

As responsible farmers we look to reduce and convert ammonia where possible within our facilities for aquatic health.

As with all nutrient discharges, the level of Total Ammonia is highly variable between waterways, and regulators will set limits depending on the operator and on which river system operations are occurring.

In regard to Ammonia, our Lonnvale Hatchery recorded 0.009 milligrams per litre (median result) within its discharge in 2020, which independent reporting by Freshwater Biomonitoring has found has had no impact on the waterway 200 metres downstream from our operations.

All Huon Freshwater sites analytically measure Total Ammonia levels within their discharge monthly.

TOTAL PHOSPHOROUS

Phosphorous is a constituent of plant cells, essential for cell division and development of the growing tip of the plant, however an excess of phosphorous in water can speed up eutrophication (an over abundance of mineral and organic nutrients which results in a reduction in dissolved oxygen).

Levels of Total Phosphorous approved for discharge by the EPA vary between operators and locations, for example Ti Tree Bend Wastewater Treatment Plant is approved to discharge 10 milligrams per litre of Total Phosphorous into the River Tamar.

Our Millybrook Hatchery discharged 0.061 milligrams (median result) per litre into the South Esk River (a tributary of the Tamar) in 2020.

All Huon Freshwater sites analytically measure Total Phosphorous levels within their discharge on a monthly basis.



TOTAL SUSPENDED SOLIDS

Total Suspended Solids are particles that are larger than two microns (0.002mm) in the water column, anything smaller than this is considered a dissolved solid.

Most suspended solids are made up of inorganic materials, although bacteria and algae can contribute to the total solids concentrate. Suspended solids can clog fish gills, either killing them or reducing their growth rate.

They can also reduce light penetration, which, in turn, reduces the ability of algae to produce food and oxygen.

When the flow rate of a waterway slows, as at an estuary or reservoir, the suspended solids settle as silt or sediment, potentially smothering bottom dwelling organisms, affecting fish breeding areas and smothering macroinvertebrates.

According to the Australian Water Quality Guidelines (www.waterquality.gov.au), previous USA and European water quality criteria recommended a permissible level of suspended solids of 25 milligrams per litre, while Canadian water quality guidelines recommend that the change in suspended particulate matter concentration should not be permitted to exceed 10 milligrams per litre.

Huon's Springfield Hatchery site recorded a discharge level of three milligrams (median result) per litre in 2020.

All Huon Freshwater sites analytically measure Total Suspended Solids levels within their discharge monthly.

OTHER INPUTS

We also measure other inputs which we consider crucial to our understanding of the aquatic environment, such as pH levels (field sampling daily and laboratory monthly), Dissolved Oxygen (field daily), Biological Oxygen Demand, Dissolved Reactive Phosphorous, Nitrate and Nitrite and Thermotolerant Coliforms.

At some sites we have discontinued measurement of indicators such as Biological Oxygen Demand and Thermotolerant Coliforms as we consistently find that levels are too low to be detectable in the laboratory.

There are other measures we see as crucial biological indicators, such as Dissolved Reactive Phosphorous - the form of phosphorous that is readily bioavailable to algae and a source of potentially unwanted plant growth - however we are unable to compare our figures with other approved catchment discharge levels, as it is not a requirement for the majority of the approved discharge sites to measure this input.

The State Government has conducted broadscale monitoring of river conditions across Tasmania since 1994 through DPIPWE's River Health Monitoring Programme, which focuses on macroinvertebrate communities and their habitat to measure river health.

Macroinvertebrates are sensitive to changes in their habitats that occur over time and can summarise the history of conditions in rivers.

The advantage of macroinvertebrate assessments over water monitoring programmes that only measure nutrient concentrations, is that monthly or weekly water sampling may not detect the occurrence of short-term adverse conditions such as high pollution levels in the discharge. However healthy macroinvertebrates equate to a healthy river.

At a minimum, all our freshwater sites that have a discharge will conduct twice annual macroinvertebrate sampling both above and below the facility by a suitably trained independent sampler to AusRivas standard, with results provided to the EPA.

Our Lonnvale (Russell River), Bridport (Brid River) and Springfield (Myrtle Creek) hatcheries consistently achieve an 'A' rating for river health, while Millybrook (South Esk River) achieves an 'X' (top) rating.

Macroinvertebrate diversity and density numbers within our wetlands outlet at our Meadowbank Hatchery regularly exceed the results received within the River Derwent at the same location.

We take aquatic health seriously and all results from our FIP are available on our website.

