

Ecologically sustainable freshwater aquaculture development utilizing best practice water management techniques for Atlantic salmon and other freshwater species

- Location:** Tasmania: - Deloraine
- NRM Region:** NRM North Region
- Industry:** Aquaculture
- Group:** 41 Degrees South Aquaculture
- Issue:** Fresh water aquaculture recycling, wetland restoration and minimizing water usage and nutrient loading
- Key Outcomes:**
- Conversion of previous fish farm from a traditional flow through process to one where the water is recirculated through the use of extensive wetlands.
 - Adoption of new water management techniques to minimise water usage and nutrient loading into the natural environment.
 - The project is now seen as a benchmark for salmon and related freshwater-based industries.

Background

41° South Aquaculture has been farming Atlantic salmon for several years using a traditional, flow-through system. In this system, water is taken from the river, directed first to culture ponds and then to a settlement pond, to remove suspended solids, before being returned to the river. Under this method, the maximum production of fish is 5 to 10 tonnes per annum and ‘cleansing’ of the water is incomplete. Dissolved contaminants such as ammonia, carbon dioxide, nitrates and phosphates remain in the water column and enter the river system.

An alternative technology, involving recirculation of the water, is in widespread use in Europe, particularly in Denmark, where it is no longer acceptable to farm fish in flow-through farms. Australia has been slow to adopt this technology due to the perceived added cost and, at the time this project was approved, all other outdoor fish farms in Tasmania used the flow-through method, although a few operations have used recirculation on a limited basis at a few sites, during periods of extremely low water level.

The Project

The primary objective of this project was to establish a new benchmark for best practice aquaculture production techniques for Australia's freshwater aquaculture industry. This required the conversion of an existing flow-through system to recirculation, where water is reused continually after undergoing natural treatment to remove contaminants. By implementing this innovative technology, the productive capacity of the site was expected to increase by up to 10-fold, to 50 tonnes per annum, with no contaminants being released into the environment and water usage reduced significantly.

Tanks were constructed to hold the salmon, replacing the existing earthen ponds. A header dam supplied the tanks with water, which was oxygenated prior to entering the tanks. Waste water flows through channels into a settlement pond, where suspended solids are allowed to settle out of the water column. Water then flows into an artificial wetland, created by the construction of a levee bank in an existing flood area at the bottom of the farm. Native plants remove dissolved contaminants and re-oxygenate the water through photosynthesis. This water is then pumped back to the header dam for reuse. Approximately 10% of the total water flow is replaced per day, rather than 100% in a flow-through situation.

Outcomes

- The innovations developed through the project are available for public inspection. The site is now ecotourism certified and the wetlands are providing a healthy habitat for native species including platypus.
- The adjacent river system is benefiting as the water quality at the pump outlet exceeds the quality of the water at the river intake.
- Conversion of the fish farm was completed within the grant period and fish, grown exclusively using this new water recirculation system, are now being sold on a commercial basis.



Salmon tanks (Photo: Don Defenderfer)

The Future

As production is ramped up to full capacity, the ability of the wetlands to filtrate and re oxygenate the water will be monitored on an ongoing basis. In the future, and depending on capacity constraints, it may be necessary to extend the wetlands and/or consider how the impacts on the river system may be minimized even further.



Water reticulation system (Photo: Don Defenderfer)



Wetland (Photo: 41°South)