

MBBR Plant Protects Environmentally Sensitive Area

The Client

Aquacria-Piscícolas is a turbot fish farm consisting of a quarantine/pre-growing facility with a capacity of 400,000 juveniles per year, in four batches, and a fattening plant with an annual capacity of 270 tons.



The Client's Needs

The facility is located in a natural preservation area in the environmentally sensitive area of Torreira in the northern part of Portugal. The property ends at the beach of Quintas do Sul and is exposed to the full force of the Atlantic Ocean.

Water treatment in fish farms with recirculation systems is necessary to minimize the amount of harmful pollutants, which may hamper growth at elevated levels in the water.

The water will gradually become polluted by fish respiration, excretions and by decay of surplus feed. To achieve a high degree of recirculation and very low water demand, these components must be removed from the water: carbon dioxide (CO₂), ammonium (NH₄), nitrite (NO₃), harmful bacteria, particles and organic matter.

Veolia's Solution

The solution was an installation of a closed loop fish farm and treatment processes for recirculated sea water utilizing the AnoxKaldnes™ MBBR technology. The MBBR technology is a fixed film system where plastic carriers act as a protected surface area for bacterial growth. Low maintenance, stainless steel aeration grids and effluent screens provide oxygen and mixing energy and retain the media in the reactors.

The Design

The treatment system is based on several different unit processes, where water is pumped out of the fish basins, treated and then returned to the fish basins. The complete process forms a closed loop design.

The main objective of the AnoxKaldnes™ moving bed biofilm reactors is to remove ammonium and nitrite by nitrification with the added benefit of the removal of organic matter. Each of the unit processes are designed with spare capacity, and the combination of processes provides the stability needed.

The AnoxKaldnes™ MBBR system for the main basins consists of two parallel trains of MBBR. MBBR 1 has 4 reactors in series, while MBBR 2 has 3 reactors in series. Each reactor has a water volume of 33 m³. AnoxKaldnes K1 media is used in all reactors.

A simplified flow diagram of the main system is shown. There is a fish basin with four raceways, and the flow is created by propeller pumps.

The Results

In summary, the AnoxKaldnes MBBR system at Aquacria is able to achieve very low effluent concentrations of ammonium and nitrite.

High nitrification rates seen in batch tests with biofilm carriers spiked with ammonium show that the nitrifying biofilm has the ability to remove a lot more ammonium if the ammonium concentration in the main fish basins should increase. The treatment process proves to be reliable and operator friendly.

