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# Copper-Alloy Nets Withstand Harsh Offshore Conditions

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## Challenge

The growth of organic matter on nets creates a variety of challenges for fish farmers. Blockage impedes water flow, which decreases the oxygen content in the water. This leads to a lower feed intake, causing slower development of fish. A cleaner environment translates into reduced stress for fish because of fewer net changes and reduced labor for cleaning.

Researchers at Turkey's Canakkale Onsekiz Mart University were looking for an effective way to improve aquaculture in the Northern Aegean Sea between Turkey and Greece. The location (Dardanelles Strait) withstands approximately 12 storms each year as well as three to five meter-high waves. In addition, water flows in both directions along the strait, from the Sea of Marmara to the Aegean, forcing a surface current in one direction and an undercurrent in the other.

## Solution

The strait's tough weather conditions require a durable material for successful fish farming. Scientists at Canakkale Onsekiz Mart University, working with the University of New Hampshire, believe copper-alloy mesh may be the answer to these difficult conditions. They are conducting trials in 50 meters of water. The installation includes two 150 m<sup>3</sup> cages, one cage made of silicon-bronze alloy and one cage made of copper-zinc alloy, containing 5,000 European sea bass (1.5 tonnes at harvest). The project investigates the growth performance of the fish as well as the feed ratio. It includes durability tests and monitoring of organic matter. Commercial sea bass diets with optimum protein and lipid levels (P/E ratio) will be used in the growth experiment.

Copper-alloy net cages naturally inhibit the growth of organic matter, parasites and pathogens, improve water flow and circulation, and help maintain higher oxygen levels for healthier fish. In addition, copper-alloy mesh cages maintain their shape against strong waves and currents. The Dardanelles suffer predator attacks from sharks and seals. Copper-alloy mesh resists predators and prevents the escape of fish.



## Results

Initial findings in Turkey are positive. Over a 90-day period, the sea bass grew nine times their original stocking size. The feed conversion rate through three months has been as low as 1.26. Traditional sea bass feed conversion rates are approximately 1.4. In the future, copper net cages may allow the industry to exploit new areas of production in Europe, far from the coasts, since their resistance to sea currents and waves enables off-shore aquaculture. Copper-alloy meshes resist corrosion and last for five years or more, compared to traditional solutions that only last a few months before cleaning is required. In addition, the copper mesh is 100 percent recyclable. The initial production of copper nets can utilize recycled materials, further reducing CO<sub>2</sub> emissions.