

# **FLOW, AERATION AND CARBON DIOXIDE TRANSFER RATES FOR AIRLIFTS USED IN RECIRCULATING AQUACULTURE SYSTEMS.**

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Airlifts allow recirculating systems to be simplified, potentially reducing capital costs, and minimizing maintenance issues. They can be designed to concurrently recirculate water, aerate water, and remove carbon dioxide. This study sought to measure the rates of water movement and gas transfer for commonly sized PVC pipes ranging from 10.2 to 20.3 cm in diameter that can be used in low head operations with airlift pumps.

Replicate systems (n=3) consisting of a 3-m diameter tank (1.2-m depth, volume approximately 7.8 m<sup>3</sup>) were used to obtain the CO<sub>2</sub> and O<sub>2</sub> mass transfer coefficients for the system. Open tubing airlift units were constructed for each filter/tank combination and supplied with air by a regenerative blower for recirculating water movement through the filters. The system was designed to mimic head loss conditions that are seen with PolyGeysers<sup>®</sup> biofilters, ranging from 15.2 to 45.7 cm. Air flow to water flow ratios ranging from 0.5 to 2.0 were used in obtaining the mass transfer coefficients. Water flow rates varied from 170 to 490 Lpm. Current data indicates oxygen mass transfer rates ranging from 0.05 to 0.19 kg O<sub>2</sub>/hr depending on airlift pipe diameters, water flow rates, G:L ratios, and salinity. Although airlifts are capable of supporting brood stock systems, computer modeling studies indicate that the airlifts must be complemented by in-tank aeration for heavily loaded fish tanks.