

# Optimising Facility Location and Sizing for Coral Aquaculture Production

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## Abstract

Active restoration is increasingly being seen as a viable method for reversing global coral reef decline in many locations. We assess coral aquaculture production as a restoration strategy to grow and deploy cultivated corals to specified reef locations in the wild. We formulate and solve a novel mathematical programming model of the facility location and sizing problem for coral aquaculture. This is used to address crucial strategic decisions regarding the number, location and sizing of facilities, as well as operational decisions on growth time to minimise total costs. The characteristic function for coral survival based on facility growth time is shown to be critical in determining the optimal growth time. Computational experiments demonstrate that the optimal number and location of facilities are sensitive to changes in the reefs serviced and the relative weighting of capital and operational cost parameters. This demonstrates the value of data clarity to minimise total costs.

**Keywords:** optimisation, facility location, facility sizing, coral aquaculture, reef restoration

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Lippmann, R. B., Helmstedt, K. J., Gibbs, M. T., & Corry, P. (2022). Optimising facility location and sizing for coral aquaculture production. *Proceedings of The Royal Society of Queensland*, 131, 149. <https://doi.org/10.53060/prsq.2022-14>

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