

Red Sea Hydrodynamic and Dispersion Modelling

Client

National Prawn Company

Date

2007 – yet to complete

Services & Expertise Provided

Far field 3D hydrodynamic and AD modelling;

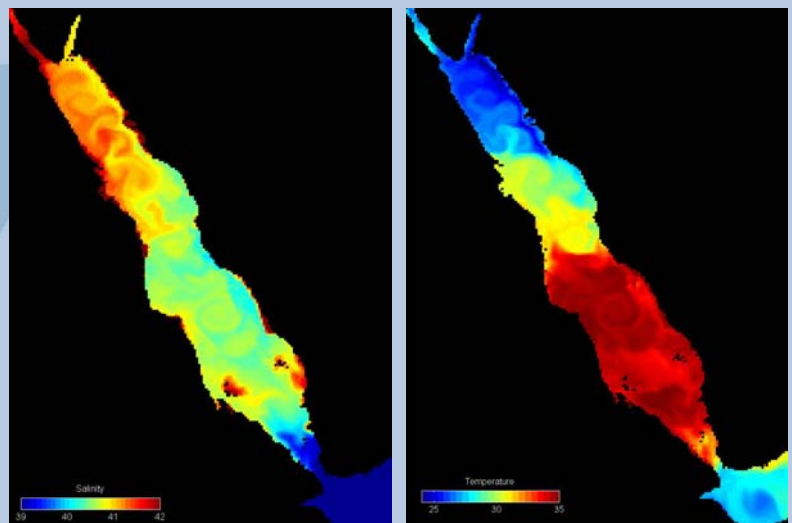
Detailed 3D hydrodynamic and AD modelling; and

Scenario assessment of planning options.

The National Prawn Company (NPC) owns and operates the world's largest fully integrated desert coastal aquaculture project, which is located on the Red Sea coast of Saudi Arabia 150 km south of Jeddah. The farming operations rely on a local lagoon system that has been subject to modification as operations have developed. As such, the need has arisen to come to a better understanding of the hydrodynamics and flushing of the lagoon (especially generation and movement of hypersaline bottom currents) and its exchange with the Red Sea.

In response to this need, BMT WBM was commissioned to develop and calibrate separate three dimensional hydrodynamic and advection dispersion models of the entire Red Sea and the lagoon system. The Red Sea ('far field') model was calibrated to sea surface temperatures and seasonal salinity changes, and provided tidal boundary conditions for the separate lagoon model ('detailed' model). The lagoon model was calibrated to locally collected data, and then used to inform management decisions regarding the lagoon and impacts of potential future expansion.

The three dimensional ELCOM model was used in both cases, and this study supported its upgrade to include the ability to simulate selected hydraulic devices, as the lagoon system contained several culvert cross-connections. Application of ELCOM to the entire Red Sea was the largest ever attempted with the model.



Red Sea Surface Salinity and Temperature Contours