



## DHI CASE STORY

## SUPPORTING EXPANSION OF FISH FARMS IN TASMANIA

An integrated decision support system to support an environmentally safe increase of aquaculture production in Macquarie Harbour

The expansion of aquaculture in Macquarie Harbour is set to anticipate and meet the growing regional and global demand for marine salmon and trout products. We were called in by one of the local growers to conduct a diligent study for this expansion and lead discussions with the involved stakeholders — the three growers (currently situated in the harbour) and the local authorities.

Our thorough study enabled us to identify a scenario meeting both the needs for increased fish production and environment preservation. It resulted in the approval of a 64% increase in leasable water space expansion, expected to lead to a local production growth from 6,000 tonnes up to 30,000 tonnes — equivalent to AUD 379 million yearly farm gate value.

### ACCURATELY DEFINING THE HARBOUR'S CARRYING CAPACITY

The backbone of this unprecedented expansion was to accurately define the carrying capacity of the harbour. To do so, we conducted a comprehensive modelling study combining 3D hydrodynamic, depositional and ecological models.

The accuracy of the models greatly relies on the quality of the measurement data used for their calibration and validation. To obtain this data, we conducted a comprehensive field campaign over a period of 14 months, including sampling of the water quality, seabed sediment testing and Acoustic Doppler Current Profiler (ADCP) deployments. We also utilised existing historical data — over 10 years of records on river flow, wind and other meteorological parameters.

Our models specifically permitted to study the fate of nutrient release from fish farms into both the water column and the seabed. This allowed us to determine how many fishes could be farmed in the harbour (that is, its carrying capacity) before adverse impacts would occur on both the environment and the sustainability of the production.

### IDENTIFYING A SUSTAINABLE EXPANSION SCENARIO

One of the major challenges in this project was to elaborate a farming expansion scenario supported by an Environmental Impact Statement (EIS) which would comply with the authorities' requirements. Previous noncompliant propositions were rejected, which led the grower of this project to come to us, knowing our credibility and experience in similar projects.

### SUMMARY

#### CLIENT

Sealord Aquaculture

#### CHALLENGE

- Meeting the growing regional and global demand for salmon and trout production
- Ensuring sustainable utilisation of the local marine resources
- Meeting the authorities' requirements — mainly in terms of environmental impact

#### SOLUTION

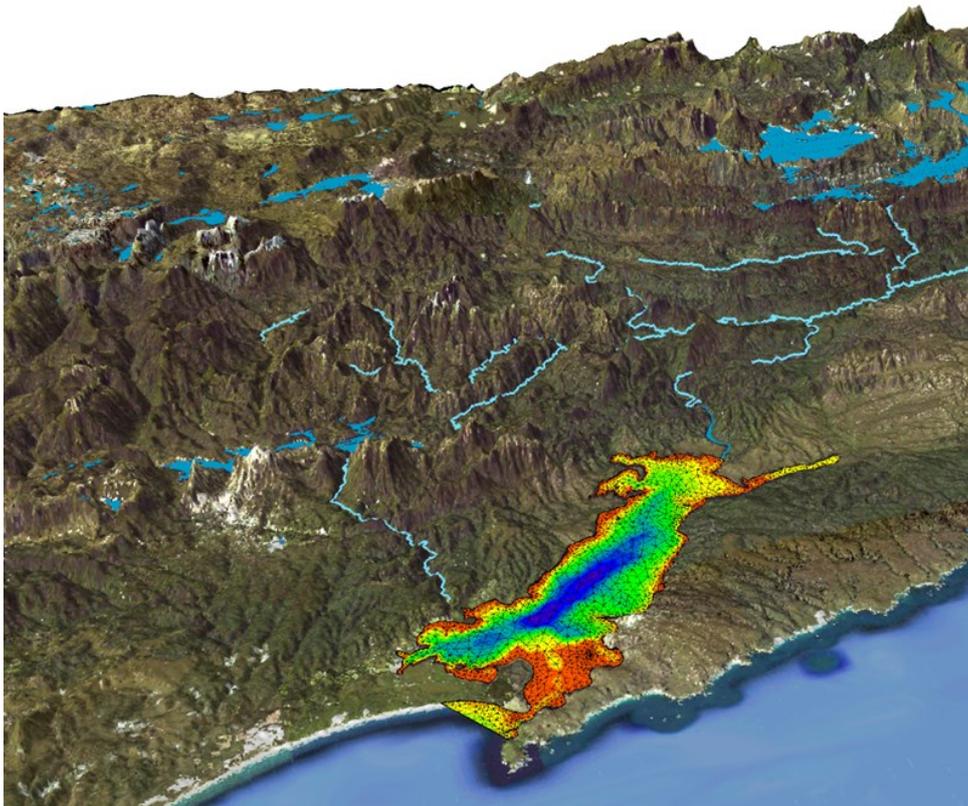
- Thorough study integrating an extensive collection and analysis of field data, 3D hydrodynamic and ecological modelling
- Identification of scenario meeting both the needs for increased fish production and environment preservation
- Establishment of a long-term environment monitoring program to ensure the sustainability of the expanded farming

#### VALUE

- Provision of an integrated decision system to support the expansion of the aquaculture production
- Production of an Environment Impact Statement (EIS) approved by the authorities
- Expected production increase from 6,000 tonnes up to 30,000 tonnes — equivalent to AUD 379 million yearly farm gate value

#### LOCATION/COUNTRY

Tasmania, Australia



*Hydrodynamic modeling of the Macquarie Harbour — West coast of Tasmania*

Our thorough modelling study provided the means to identify a farming expansion scenario meeting all three growers’ constraints and the authorities’ requirements — with an approved EIS.

To do so, we executed iterative simulation runs based on our models. The simulation parameters included various stocking densities, cage spacing and subsequent nutrient release.

Several simulations clearly identified a carrying capacity that would place the environment at risk, thus leading to the selected scenario that was acceptable to all parties concerned.

**EXPANDING THE PRODUCTION UP TO 30,000 TONNES**

The selected scenario permitted a 64% increase in leasable water space. This unprecedented expansion is expected to lead to a production growth from 6,000 tonnes up to 30,000 tonnes — equivalent to AUD 379 million yearly farm gate value.

**CLIENT TESTIMONIAL**

“ DHI did a great job understanding the issues and providing Sealord with a useful management tool.

*Lance Searle — Aquaculture Manager — Sealord Aquaculture*

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As of now, the production has already been increased from 6,000 tonnes to 16,000 tonnes (worth approximately AUD200 million in farm gate sales on an annual basis).

**LONG-TERM ENVIRONMENTAL MONITORING**

In order to ensure the continuous sustainability of the expanded fish farming in Marcquarie Harbour, we engaged in a long-term Environmental Monitoring Program (EMP). The farming impacts are monitored both in-farm and harbour wide.