

# INSTITUTE FOR MARINE & ANTARCTIC STUDIES

## FISHERIES & AQUACULTURE

### RESEARCH CAPABILITY

At the Institute for Marine and Antarctic Studies (IMAS) we are dedicated to seeking knowledge and innovation to provide adequate and sustainable nutrition to an increasing world population.

The IMAS fisheries research program supports the long-term sustainable harvest of wild marine resources, and our aquaculture research program is aimed at delivering significant increases in production while minimising environmental impacts.

IMAS has extensive international research capacity in fisheries and aquaculture, which is greatly enhanced by our key collaborative partnerships and the development of cutting-edge technology.

#### Research Disciplines

Our fisheries and aquaculture research capability is organised around eight research disciplines and is supported by our state-of-the-art laboratory, aquaculture, and boat and dive facilities.

These research disciplines are:

- Animal Performance
- Aquaculture Innovation
- Aquatic Animal Health, Biosecurity, and Welfare
- Ecosystem Effects and Interactions
- Global Seafood Trends
- Management Systems
- Recreational and Traditional Fisheries
- Recruitment Dynamics

#### FISHERIES & AQUACULTURE

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#### Animal Performance

Across wild and farmed animals; integrating physiology, nutrition, breeding, genetics and development; life-cycle analysis; climate change effects; nutrient requirements; aquafeeds and sustainable ingredients, including alternatives to fishmeal and fish oil.

#### Aquaculture Innovation

Developing “new” species for aquaculture using an integrated approach to match biology and technology and to work at a commercially relevant scale. Our current focus is on rock lobsters and water quality management.

#### Aquatic Animal Health, Biosecurity, and Welfare

Infectious disease; non-infectious disease; diagnostics; biosecurity, toxicology and welfare specific research.

#### Ecosystem Effects and Interactions

Aquaculture and environment, including sediments, hydrology, modelling, management, policy; ecosystem effects of fishing including ecology and applied to fishery accreditation; integrated coastal management; climate change.

#### Global Seafood Trends

Meta-analysis of datasets and predictions; climate change effects on fisheries and aquaculture; changes in seafood consumption.

#### Management Systems

Fishery assessments including data-poor fisheries; optimising harvests; closed areas; bioeconomics.

#### Recreational and Traditional Fisheries

Quantifying catch and trends in stocks; resource sharing; post-release survival; economic benefits.

#### Recruitment Dynamics

Larval source-sink dynamics; managing egg production; temporal trends.



Experimental Aquaculture Facility, Tarooma, Tasmania

### Laboratory Facilities

*Aquatic Animal Health:* Disease challenge: amoebic gill disease (AGD), yersiniosis, flexibacteriosis. Amoebic Gill Disease: supply of amoebae (*N. perurans*); in vitro testing for (*N. perurans*); viability (neutral red); metabolism (high throughput – CellTiter-Blue®); disease challenge.

*Histopathology:* routine histology (paraffin sections, H&E staining), various histochemistry stains [e.g. PAS-AB, Prussian blue], slide digitization and quantification including image analysis.

*Fish immune system:* immunohistochemistry (chloride cells, mucous cells, PCNA and others); lysozyme activity; complement activity (alternative and classical), antibody level.

### Aquatic Animal Nutrition and Feeds

Basic analytical capacity for macro-nutrients (crude protein, total lipid, lipid class, gross energy) and links for detailed nutritional biochemistry, molecular analysis and physiological analysis.

There are facilities for processing ingredients and production of experimental feeds for fish, crustaceans and abalone. Aquatic animal nutrition is supported by an extensive range of aquaculture tank systems (see below).

*Molecular Analysis:* Pathogen (including *N. perurans*) detection in host (for example gill swabs) and environmental samples [PCR and real-time PCR]. Gene expression (particularly microalgae, fish immune system and fish nutritional physiology).

*Physiological Analysis:* A range of tests are available or can be developed and include blood parameters (osmolality, haematocrit, haemoglobin, pH, melatonin, cortisol, glucose, lactate, cholesterol, triglycerides); enzymes (aerobic enzymes [Na<sup>+</sup>/K<sup>+</sup> ATPase, SDH, CS], anaerobic enzymes [LDH]; digestive enzymes [trypsin, chymotrypsin]).

### Aquaculture Facilities

The Fisheries and Aquaculture Centre has a range of tank and aquarium facilities for aquaculture and aquatic biology research. Our Aquaculture Centre is based in Launceston, and the Experimental Aquaculture Facility and the Rock Lobster Culture Systems Hub are located adjacent to the Derwent River at Tarooma.

*Atlantic salmon and salmonid species:* Replicated aquaculture recirculation systems (RAS) for freshwater and seawater that are suitable for experimental work on nutrition, feeds, health and production include the following:

- 7000-L tanks (12 circular tanks) equipped with automatic feeders, LED lighting and feed traps. The system can be used at one or concurrently at two temperatures with a working range 16-22°C.
- 3500-L tanks (2 units of 10 and 11 square tanks)
- 2500-L tanks (12 circular tanks) equipped with individual filtration, automatic feeders, LED lighting, and feed traps.
- 1000-L (12 tanks) on independent RAS.
- 500-L tanks (2 units of 6 circular tanks) on RAS and equipped with LED lighting and feed traps.
- 300-L tanks (4 units of 6 to 12 circular tanks).
- Hatchery including incubators for up to 64 replicates.

*Rock (spiny) lobsters and crustaceans:* State-of-the-art systems for maintenance and experimentation on all life-cycle stages of rock lobsters support extensive research capability in rock lobster aquaculture and fisheries. Aquaculture facilities include seawater treatment plant, broodstock holding, hatcheries, larval and juvenile rearing. Wild-caught lobsters are held outdoors in raw seawater.

*A range of other facilities including:* systems for temperate, tropical and invasive species (24 x 80L cylindrical tanks; 36 x 100L prawn tanks); constant environment rooms; static respirometers and swim tunnels for respiratory physiology; algal and live hatchery feed production.

### Boating and Dive Facilities

IMAS manages a fleet of small coastal craft that are used for fisheries stock assessment research and to support numerous fisheries, environmental and ecological studies around Tasmania. There are currently 7 research vessels in the fleet ranging in size from 4 to 7m.