



# SELFDOTT

**From capture based to self-sustained aquaculture**

## The Challenge

Tunas constitute the most valuable fishery worldwide. Except for the skipjack tuna, most tuna stocks are considered fully exploited, over-exploited or depleted (FAO, 2002). In the Mediterranean Sea, the species of greatest value is the Atlantic bluefin tuna. Over the last decade, a "capture-based" aquaculture industry has developed in the Mediterranean Sea, which involves the capture of migrating wild fish and their fattening in floating cages for periods ranging from 2 months to 2 years. Fuelled by the increasing demand for this unique fish by the sashimi-sushi market in Japan, Europe and the United States, the expansion of the fattening industry is considered threatening to the wild stock, which is now considered to be overfished. The International Commission for the Conservation of Atlantic Tunas (ICCAT) the international organization responsible for the conservation of tunas in the Atlantic Ocean and its adjacent seas, is implementing a 4-year gradual reduction in the Total Allowable Catch for Eastern Atlantic and Mediterranean bluefin tuna, in an effort to address the increasing scientific, public and NGO concern over the status of the wild stocks and the threat of extinction of the species due to overfishing.

One way to alleviate the pressure on the wild fishery of the bluefin tuna and aid in its conservation would be its domestication and the development of a self-sustained industry, which will propagate this species in captive conditions, rear the larvae and produce fingerlings for further grow-out on suitable, scientifically formulated and environmentally performing feed, as it is done successfully in the EU for species such as the Salmon, Sea bass and Sea bream. Therefore, there is a great interest in developing captive Atlantic bluefin tuna broodstocks and larval rearing methods to support the sustainable development of bluefin tuna aquaculture. Studying the reproductive biology and larval rearing of this species in captivity would also result in a better understanding of its life history, which is necessary for management of the wild stocks.

## Project Objective

SELFDOTT will implement the existing knowledge on the artificial control of reproduction of the Atlantic bluefin tuna (BFT), *Thunnus thynnus*, to obtain viable eggs, and study embryonic and larval development for the production of fry (juveniles). At the same time, suitable and environmentally performing feeds for the growout of BFT will be developed, thus reducing or eliminating the practice of raw fish importation and feeding by the fattening industry.

Wild juvenile and mature BFT will be reared in captivity at two sites in the Mediterranean, and will be used to study puberty, gametogenesis, and the influence of diet on reproductive maturation and gamete qual-



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### EATiP Thematic Area of Relevance

**TA1:** Product Quality, Consumer Safety and Health

**TA2:** Technology and Systems

**TA3:** Managing the Biological Lifecycle

**TA4:** Sustainable Feed Production

**TA5:** Integration with the Environment

**TA6:** Knowledge Management

**TA7:** Aquatic Animal Health and Welfare

**TA8:** Socio-Economics and Management

### Key Words

Bluefin tuna, *Thunnus thynnus*

### Project Information

**Contract number:**

212797

**Contract type:**

Small or medium-scale focused research project

**Research area:**

KBBE - From capture based to self-sustained aquaculture

**Duration:**

36 months (01/01/2008 – 31/12/2010)

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ity. Mature fish will be induced to spawn using hormone implants and the eggs will be collected using devices designed specifically for cages. To establish the knowledge-base for controlled development of BFT larvae, the mesocosm and artificial larval rearing methods will be employed. The ontogenesis of essential biological functions will be studied, including environmental perception, digestion, immunity and behaviour. A protocol for the commercial-scale larval rearing of BFT will be recommended at the end of the project.

## Key New Knowledge Expected

- Substantiation of the current knowledge on the reproduction of captive bluefin tuna
- Establishment of the knowledge-base for its larval rearing and the development of suitable feeds
- production of fertilized eggs, viable larvae and fingerlings of bluefin tuna for further rearing
- production of scientific publications

## Potential Impacts



### Environment

- A better understanding of the biology of bluefin tunas could contribute to the improvement of the management of the stocks and reduce the pressure on this species critical for marine food webs and ecosystems
- The production of tuna by means of aquaculture techniques independently from wild captures:
  - Reduction of the pressure on wild bluefin tuna populations
  - Increase of the production satisfying the market demand without overfishing wild stocks
- Reduction of the pressure on the pelagic wild populations used as tuna bait
- Reduction of the environmental impact because of the better digestibility of the artificial food



### Policy

- The newly generated knowledge could be used to increase the knowledge of the bluefin tuna in the wild and contribute to enhance the stock regulation policies.



### RTD

- Better knowledge on the reproduction and the larval stages of captive bluefin tuna.
- Standardization of feeding performance



### SME

- New highly valuable production



### RTD & SME

- Development of artificial feeding, implying the increase of feeding efficiency and a reduction of waste and costs

## Related Publications/Projects

CORRIERO,A., MEDINA,A., MYLONAS,C.C., BRIDGES,C.R., SANTAMARIA,N., DEFLORIO,M., LOSURDO,M., ZUPA,R., GORDIN,H., DE LA GANDARA,F., BELMONTE,A., POUSIS,C., DE METRIO,G., 2009. Proliferation and apoptosis of male germ cells in captive Atlantic bluefin tuna (*Thunnus thynnus* L.) treated with gonadotropin-releasing hormone agonist (GnRH<sub>a</sub>). *Animal Reproduction Science* 116(3-4), 346-357.

MYLONAS,C.C., DE LA GANDARA,F., CORRIERO,A., BELMONTE,A., 2010. Atlantic Bluefin Tuna (*Thunnus Thynnus*) Farming and Fattening in the Mediterranean Sea. *Reviews in Fisheries Science* 18(3), 266-280.

SUQUET,M., COSSON,J., DE LA GANDARA,F., MYLONAS,C.C., PAPADAKI,M., LALLEMANT,S., FAUVEL,C., 2010. Sperm features of captive Atlantic bluefin tuna (*Thunnus thynnus*). *J. Appl. Ichthyol.* 26, 775-778.