



GWP Reproduction and Genetics WP 2-7

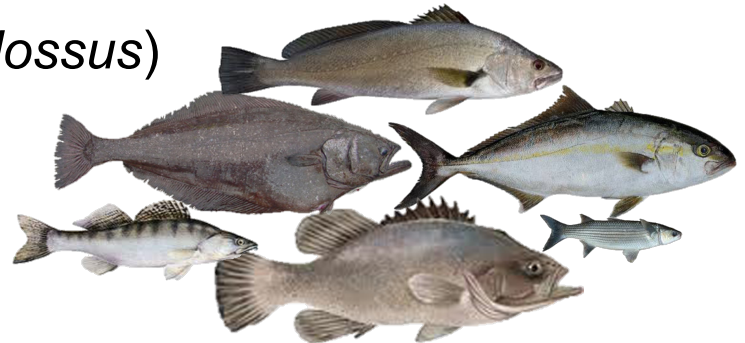


Neil Duncan, IRTA

Kick-off meeting
HCMR, Heraklion, Crete,
29-30 January 2014

Objectives

- **“In collaboration with a number of SMEs, DIVERSIFY will build on recent/current national initiatives for species diversification in aquaculture, in order to overcome the documented bottlenecks in the aquaculture production of these selected species.”**
- meagre (*Argyrosomus regius*)
- greater amberjack (*Seriola dumerili*)
- pikeperch (*Sanders lucioperca*)
- Atlantic halibut (*Hippoglossus hippoglossus*)
- wreckfish (*Polyprion americanus*)
- grey mullet (*Mugil cephalus*)



BOTTLENECKS

Increasing
importance of
reproduction

Pikeperch (*Sander lucioperca*)

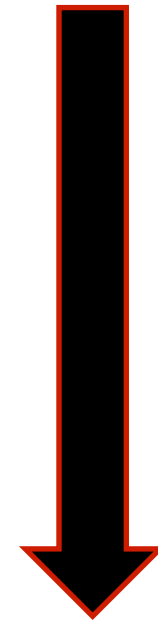
Meagre (*Argyrosomus regius*)

Atlantic halibut (*Hippoglossus
hippoglossus*)

Greater amberjack (*Seriola dumerili*)

Wreckfish, (*Polyprion americanus*)

Grey mullet (*Mugil cephalus*)



Increasing
importance of
genetics

Pikeperch (*Sander lucioperca*)



Bottlenecks

- **Lack of knowledge of the genetic variability of current broodstocks and variable or unpredictable growth rate during grow-out.**

Pikeperch (*Sander lucioperca*)



Objectives

- 1. Evaluate the genetic variability of captive broodstock in commercial RAS farms in Europe,
- 2. Compare this variability with the variability of wild individuals and define how a future genetic breeding program should be established for sustainable optimal performances through domestication of pikeperch

HCMR, UL

WP4 PM5 20,000€

	Year 1 (2014)				Year 2 (2015)				Year 3 (2016)				Year 4 (2017)				Year 5 (2018)			
	Ma	Ju	Se	De	Ma	Ju	Se	De	Ma	Ju	Se	De	Ma	Ju	Se	De	Ma	Ju	Se	De
Task 4.1																				
Task 4.2																				

Pikeperch (*Sander lucioperca*)



Expected outputs

- Characterize genetic diversity in current domesticated pikeperch broodstocks and the available wild genetic variability.
- Provide the genetic tools that will enable the industry to control broodstock genetic variability.

Meagre (*Argyrosomus regius*)

Bottlenecks



- Limited genetic variation of current broodstocks
- Variable growth rate in pre-growing phase and grow-out in cages.

Meagre (*Argyrosomus regius*)



Objectives

- 1. Evaluate the genetic variation in the available captive broodstocks of meagre,
- 2. Genetic characterization of fast and slow growers,
- 3. Development of tools that facilitate the implementation of genetic selection programs,
 - a. Develop protocols for the paired crossing of breeders with spontaneous spawning,
 - b. Describe sperm quality and cryopreservation techniques,
 - c. Develop in vitro fertilization protocols to provide planned genetic crosses,
 - d. Develop a set of SNP markers for genetic selection and stock characterisation.WP2

Meagre (*Argyrosomus regius*)



WP2

IRTA, HCMR, FCPCT, IFREMER

PM40.65 – 320,656€

	Year 1 (2014)				Year 2 (2015)				Year 3 (2016)				Year 4 (2017)				Year 5 (2018)			
	Ma	Ju	Se	De	Ma	Ju	Se	De	Ma	Ju	Se	De	Ma	Ju	Se	De	Ma	Ju	Se	De
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	44	48	51	54	57	60
Task 2.1																				
Task 2.2																				
Task 2.3																				
Task 2.4																				
Task 2.5																				

Meagre (*Argyrosomus regius*)



Expected outputs

- Characterize genetic diversity in current domesticated meagre broodstocks.
- Tools to establish genetic improvement programs that will enable the industry to control broodstock genetic variability.
- Development of genetic markers for an assisted breeding program (SNP library).
- Protocol for paired spontaneous tank spawning and in vitro fertilization procedures, sperm quality evaluations and stripping ovulated eggs.

Atlantic halibut (*Hippoglossus hippoglossus*)

Bottlenecks



- Irregular supply of fry particularly from F1/F2 broodstock; long production cycle

Atlantic halibut (*Hippoglossus hippoglossus*)

Expected outputs



- Documentation of reproductive performance of wild and F1/F2 broodstock.
- Improvement of reproductive performance of captive broodstocks (wild, domesticated F1/F2).
- Optimization of hormonal spawning induction protocols.

Greater amberjack (*Seriola dumerili*)

Bottlenecks



- Lack of reliable reproduction and of egg availability

Greater amberjack (*Seriola dumerili*)



Objectives

- 1. Describe the endocrine control of reproduction in captive broodstocks, and the nutritional status of fish during the reproductive season,
- 2. Assess reproductive potential of wild vs. captive amberjack broodstocks and identify possible reproductive/metabolic dysfunctions during gametogenesis,
- 3. Develop spawning induction methods for captive-reared and F1 broodstocks of both the Mediterranean and Atlantic stocks,
- 4. Apply the developed spawning induction methods for broodstocks maintained in cages, and examine the efficiency of an egg collector to obtain fertilized eggs,
- 5. Develop a Computer Assisted Sperm Analysis method (CASA) for the evaluation of greater amberjack sperm during the reproductive season, and evaluate the possible effects of captivity.

Greater amberjack (*Seriola dumerili*)

Expected outputs



- **Description of normal and dysfunctional maturational development.**
- **Development of an appropriate broodstock diet**
- **Development of species-specific hormonal spawning induction protocols and solve the reproductive dysfunction.**
- **Development of a methodology for collecting eggs in sea cages.**

Wreckfish, (*Polyprion americanus*)

Bottlenecks



- Lack of reproduction control and of egg availability

Wreckfish, (*Polyprion americanus*)

Objectives



- 1. Increase the availability of wreckfish broodstocks in captivity,
- 2. Describe the reproductive cycle in captivity at the level of the pituitary and gonad,
- 3. Develop spawning induction procedures for in vitro fertilization, as well as spontaneous tank spawning,
- 4. Develop a CASA for evaluation of wreckfish sperm and establish cryopreservation protocols for use in in vitro fertilization applications.

Wreckfish, (*Polyprion americanus*)

Expected outputs



- Describe the reproductive cycle of wreckfish.
- Development of species-specific hormonal spawning induction protocols.
- Development of in vitro fertilization procedures, sperm quality and stripping ovulated eggs
- Recommendations for feed formulation for broodstock diets.
- Develop protocols to form new wreckfish broodstock.

Grey mullet (*Mugil cephalus*)



Bottlenecks

- **Lack of control of the reproductive cycle; low and irregular egg quality**

Grey mullet (*Mugil cephalus*)



Objectives

- 1. Evaluate the effectiveness of hormone-based treatments on synchronizing gonadal development and improving gamete (eggs and sperm) quality in mature grey mullet,
- 2. Develop hormone-based treatments for induced spawning of grey mullet,
- 3. Optimize a scaled-up breeding of grey mullet in captivity under natural and manipulated photo-thermal regimes,
- 4. Assess the effects of captivity on first sexual maturity and reproductive potential of captive-reared and hatchery-produced grey mullet broodstocks.

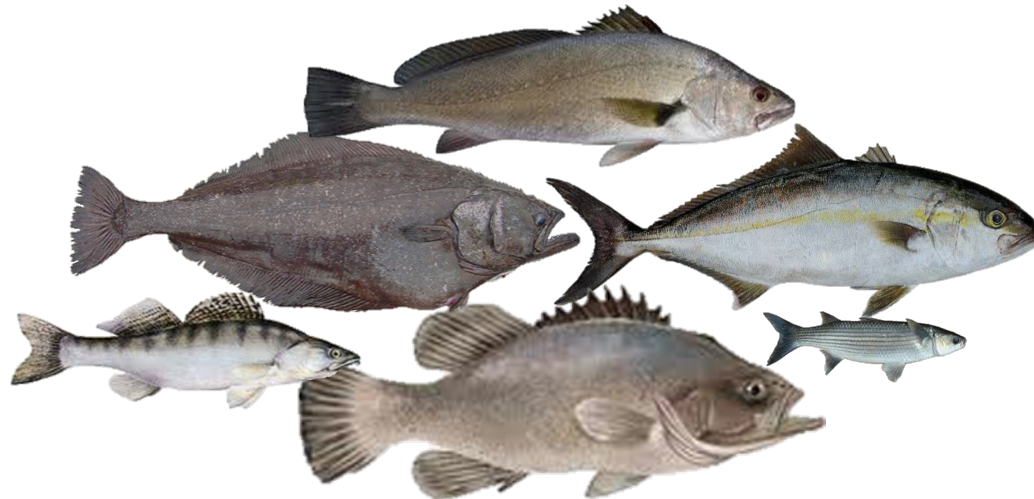
Grey mullet (*Mugil cephalus*)



Expected outputs

- Improvement of broodstock management and nutrition.
- Describe the reproductive cycle and gamete quality of mullet.
- Development of species-specific hormonal spawning induction protocols and photothermal regime for large-scale egg production.
- Protocol for shipping mullet eggs.

2020: Massive productions of new aquaculture products



THE END

Thank for your attention

