EUROFLEETS<sup>+</sup> Floating University "State and sustainable use of the ocean biological resources: the case of the *Nephrops norvegicus* (Norway lobster)" Onboard the R/V Mário Ruivo *Portugal, June 15 – July 5* 



# BIOLOGICAL SAMPLING FOR CRUSTACEANS

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LIFE CYCLE

**Most species**: <u>indirect development</u> with one or more larval stages (free-swimming larvae) – anamorphic growth.



Source: Hickman, 2006.

### **BIOLOGICAL SAMPLING**

#### Parameters:

- Total length (mm)
- Cephalothorax length (mm)
- Total weight (g)
- Sex
- Maturity stage in females
- Presence or absence of spermatophores on blue and red shrimp, giant red shrimp, and scarlett shrimp





## MAIN SPECIES

<b>SCIENTIFIC NAME</b>	ENGLISH	PORTUGUESE	FAO CODE	_
Nephrops norvegicus	Norway lobster	Lagostim	NEP	O Paula Abreu
Parapeneus longirostris	Deepwater rose shrimp	Gamba-branca	DPS	© Paula Abreu
Aristeus antennatus	Blue and red shrimp	Camarão-vermelho	ARA	© Paula Abreu
Aristaeomorpha foliacea	Giant red shrimp	Camarão-púrpura	ARS	© Sergio Ragonese
Aristaeopsis edwardsiana	Scarlet shrimp	Carabineiro-cardeal	SSH	© Paula Abreu

### NORWAY LOBSTER FEMALES

	Stage	Description	
1	Immature	Ovaries not visible without dissection. The ovaries are translucent, thin and threadlike. Uncoloured.	(no pictures)
2	Developing / Recovering	Ovaries barely visible without dissection. The gonads extends up to the 1st somite of the abdomen and have a granular appearance. Colour white to cream.	
3	Maturing	Ovaries are clearly visible through integument. The gonad occupies one third of the cephalothoraxic space. The gonads extends up to the 1st somite of the abdomen. Colour light green.	

### NORWAY LOBSTER FEMALES

Description

Turgid ovaries occupying the whole dorsal cephalothoraxic space and extending up to the 2nd somite. Eggs visible. Colour dark green.



4 Mature

Stage

Ovaries flaccid with green spots. Reabsorption of ovarian material. Most likely with green eggs on pleopods. Colour ivory with green spots.



Berried female.

5 Spent



### DEEPWATER ROSE SHRIMP FEMALES

7		Stage	Description	
/ -	1	Immature	Ovaries not visible without dissection. The ovaries are thin and translucent with a tubular appearance adherent to the dorsal portion of the stomach, not extending to the abdomen. Uncoloured.	
	2	Developing/ Recovering	Ovaries are barely visible without dissection. The cephalic lobes start to cover the sides while the abdominal extensions occupy all somites. Colour whitish, pale yellow or cream orange.	
	3	Maturing	Ovaries are clearly visible through integument. Ovaries developed and turgid, with cephalic lobes and abdominal extensions occupying the entirely the dorsal portion. The gonads appear granular. Colour dark yellow, cream orange or light green	



### DEEPWATER ROSE SHRIMP FEMALES

Description

Stage

5

Spent

Turgid ovaries extending to the whole dorsal area. Lobes and
Mature extensions well developed. Eggs well visible.
Different tones of dark green.



Ovaries after spawning are fully extended but loose turgidity becoming flaccid. Colour dark brown.





1

### BLUE AND RED SHRIMP FEMALES

Stage

Description

Ovaries not visible without dissection. The ovaries are thin and translucent with a **Immature** tubular appearance adherent to the laterals of the stomach, not extending to the abdomen. Uncoloured.



Ovaries barely visible without dissection. Cephalic lobes small but distinguishable. The gonad extends to the full length of the abdomen. Colour ivory to pink







Ovaries are clearly visible through integument. Cephalic and abdominal extensions are well developed and turgid. Colour lilac.





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Stage

### BLUE AND RED SHRIMP FEMALES

Description

Turgid ovaries occupying the whole dorsal area. Lobes and Mature abdominal extensions well developed. Eggs well visible. Colour violet or purple.



#### Ovaries large but flaccid with Spent purple spots. Colour ivory with purple spots.



### GIANT RED SHRIMP FEMALES

	Stage	Description	
1	Immature	Ovaries not visible without dissection. The ovaries are thin and translucent with a tubular appearance adherent to the laterals of the stomach, not extending to the abdomen. Uncoloured.	
2	Developing / Recovering	Ovaries barely visible without dissection. Cephalic lobes small but distinguishable. The gonad generally extends up to 3rd abdominal somite. Colour cream-orange or reddish.	
3	Maturing	Ovaries are clearly visible through integument. Ovaries developed and turgid, with evident cephalic lobes. The gonad generally extends to the 4th abdominal somite. Colour light to dark grey.	

### GIANT RED SHRIMP FEMALES

Stage Description

Turgid ovaries extending to the whole dorsal area. Lobes well developed and abdominal extensions may reach the 5th somite. Eggs well visible. Colour anthracite to black.

### Ovaries large but flaccid with Spent blackish spots. Colour greyish.





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### SCARLET SHRIMP FEMALES



### SCARLET SHRIMP FEMALES

Description

4 Mature

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Stage

Ovaries very large. Colour dark orange to brown.

Post-spawning or reabsorbing –<br/>ovaries similar to stage 1 but<br/>enlarged and flacid with dark<br/>spot probably remnant of the<br/>last spawning.SpentHepatopancreas is damaged,<br/>which is a sign of reabsorption.<br/>Colour white to pink (similar to<br/>stage 1) but with some dark<br/>spots.









### REFERENCES

#### General introduction

ICES. 2010. Report of the Workshop on crustaceans (*Aristeus antennatus, Aristaeomorpha foliacea, Parapenaeus longirostris, Nephrops norvegicus*) maturity stages (WKMSC), 19-23 October 2009, Messina, Italy. ICES CM 2009/ACOM:46. 77 pp.

Acharige, Dammannagoda, Lalith Keerthiratne, 2014. "An investigation of functional diversity of endogenous cellulase and expression of other digestive enzyme genes in freshwater crayfish (*Cherax*) species." <u>link</u>

Gonad pictures adapted from WKMSC 2010