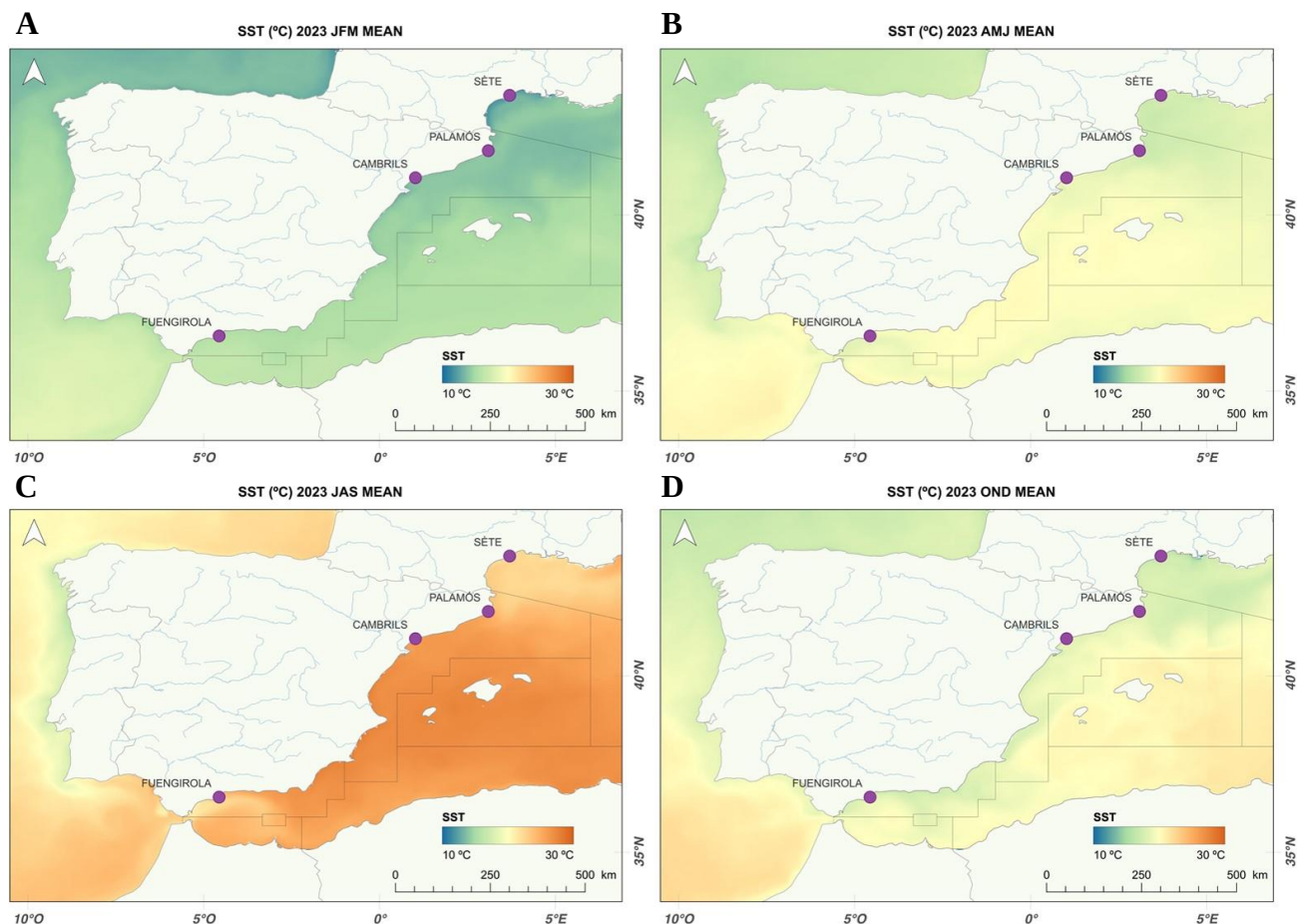
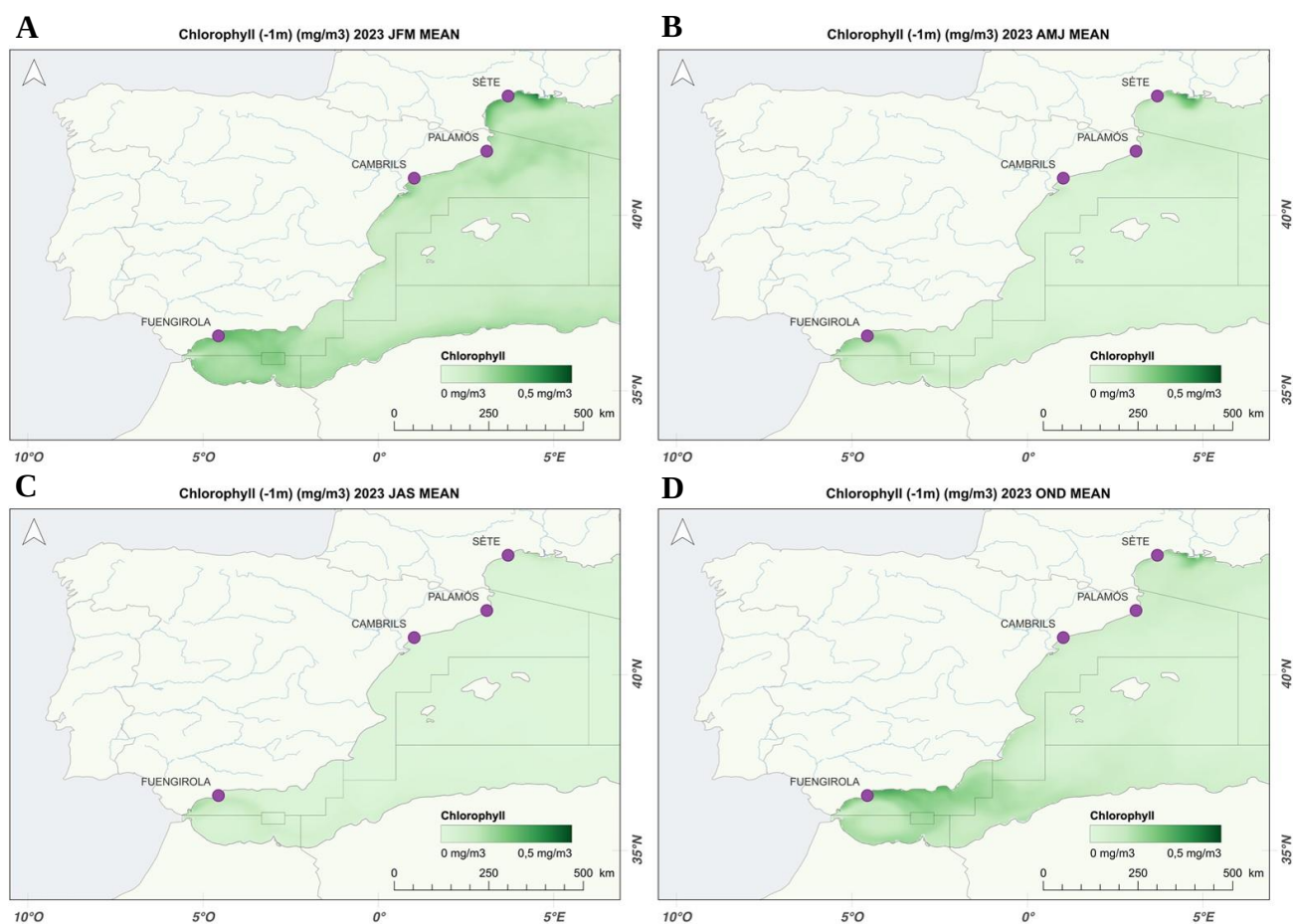


## Supplementary Material

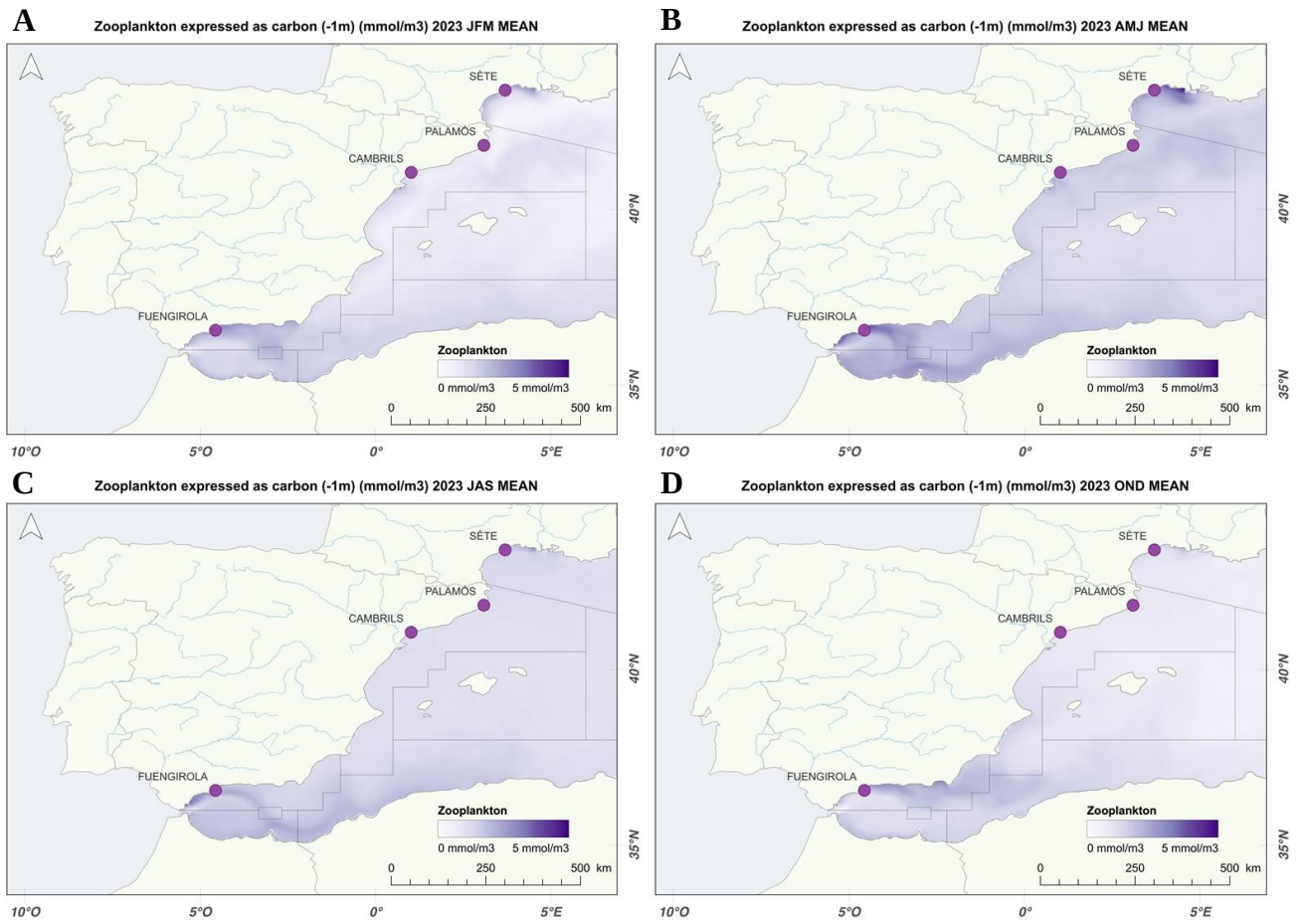
### Supplementary Figures



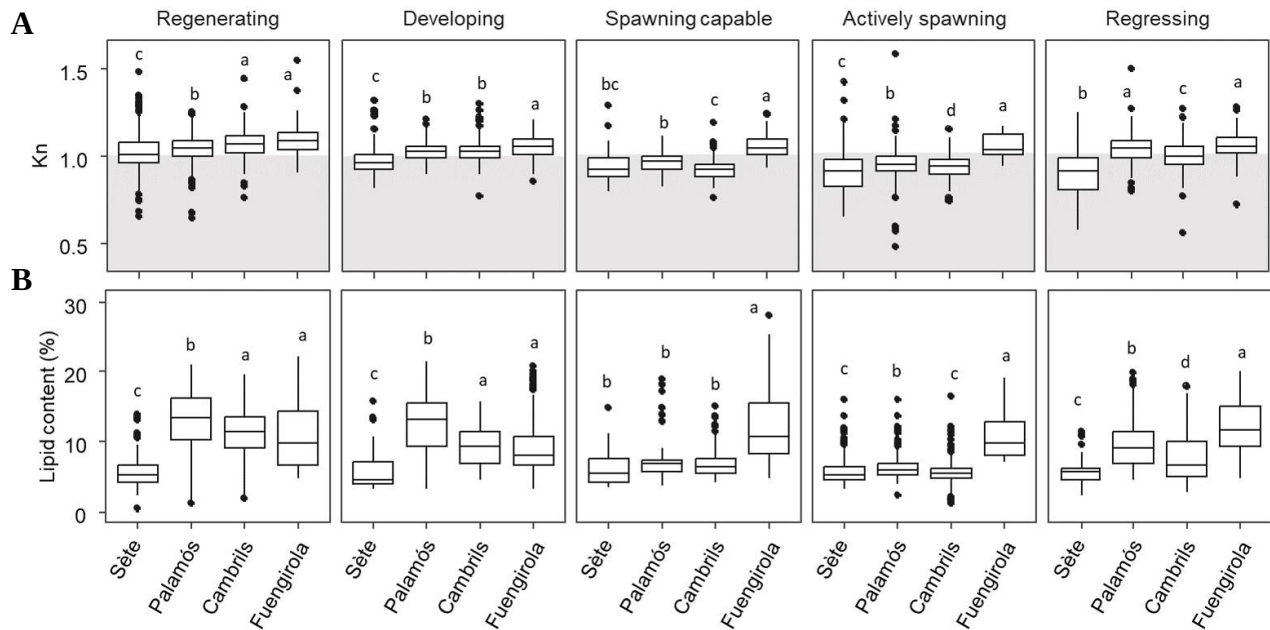
**Supplementary Figure 1.** Annual mean sea surface temperature (SST, °C) along the western Mediterranean coast (A) during January, February, March (JFM); (B) April, May, June (AMJ); (C) July, August, September (JAS) and (D) October, November, December (OND).



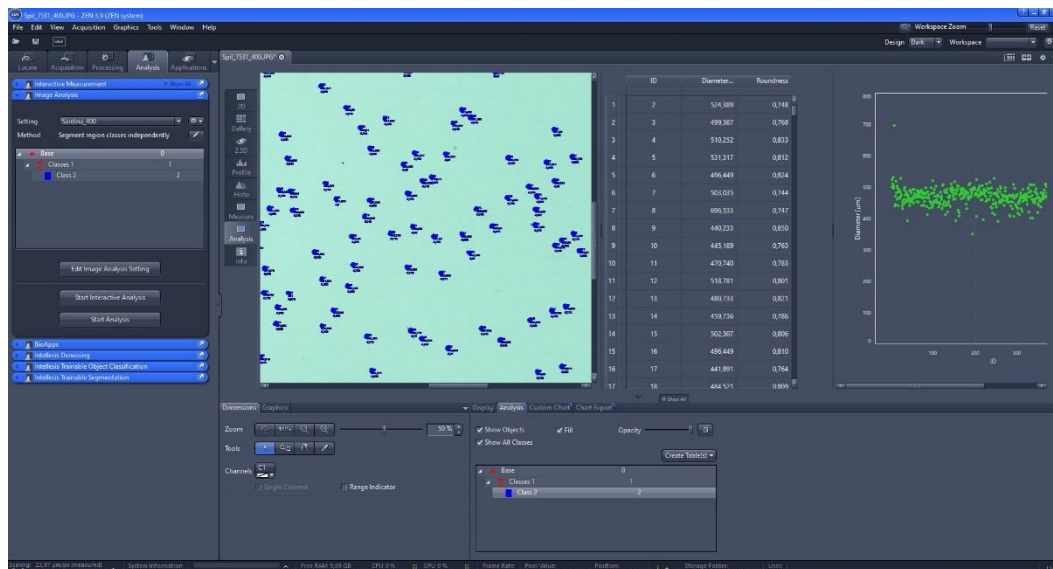
**Supplementary Figure 2.** Annual mean chlorophyll concentration (mg/m<sup>3</sup>) at 1-m depth along the western Mediterranean coast (**A**) during January, February, March (JFM); (**B**) April, May, June (AMJ); (**C**) July, August, September (JAS) and (**D**) October, November, December (OND).



**Supplementary Figure 3.** Annual mean zooplankton abundance (mmol/m<sup>3</sup>) at 1-m depth along the western Mediterranean coast **(A)** during January, February, March (JFM); **(B)** April, May, June (AMJ); **(C)** July, August, September (JAS) and **(D)** October, November, December (OND).



**Supplementary Figure 4.** (A) Le Cren's condition factor (Kn) between the sampling locations (Sète, Palamós, Cambrils, and Fuengirola) for each gonad development stage. The shaded area highlights sardines with a Kn value below 1, indicating poor condition. (B) Lipid content (%) between the sampling locations for each gonad development stage.



**Supplementary Figure 5.** Computer-aided image analysis using Zeiss Zen Imaging software ([www.zeiss.com](http://www.zeiss.com)).

## Supplementary Tables

**Supplementary Table 1.** Mean  $\pm$  SD of total body length (mm), total body mass (g) and eviscerated body mass (g) between month and sampling locations.

| Sampling location   | Month     | Total body length (mm) |       | Total body mass (g) |       | Eviscerated body mass (g) |       |
|---------------------|-----------|------------------------|-------|---------------------|-------|---------------------------|-------|
|                     |           | Mean                   | SD    | Mean                | SD    | Mean                      | SD    |
| Sète (GSA 07)       | January   | 116.65                 | 8.19  | 10.03               | 2.39  | 8.97                      | 2.09  |
|                     | February  | 124.07                 | 6.38  | 11.13               | 1.70  | 9.84                      | 1.55  |
|                     | March     | 112.63                 | 10.14 | 9.29                | 3.42  | 8.12                      | 2.83  |
|                     | April     | 117.76                 | 10.57 | 11.52               | 3.83  | 10.34                     | 3.16  |
|                     | May       | 120.21                 | 11.23 | 11.58               | 3.98  | 10.76                     | 3.72  |
|                     | June      | 110.55                 | 7.92  | 10.58               | 2.65  | 9.61                      | 2.43  |
|                     | July      | 117.04                 | 9.97  | 11.34               | 3.52  | 10.55                     | 3.24  |
|                     | August    | 130.84                 | 8.77  | 16.19               | 3.53  | 15.02                     | 3.34  |
|                     | September | 129.24                 | 10.86 | 15.94               | 4.19  | 14.71                     | 3.87  |
|                     | October   | 118.80                 | 14.51 | 11.53               | 4.64  | 10.82                     | 4.32  |
|                     | November  | 119.75                 | 7.76  | 11.36               | 2.39  | 10.59                     | 2.29  |
|                     | December  | 115.59                 | 8.35  | 10.09               | 2.49  | 9.35                      | 2.29  |
| Palamós (GSA 06)    | January   | 128.90                 | 9.53  | 14.79               | 3.81  | 13.15                     | 3.23  |
|                     | February  | 136.32                 | 7.22  | 19.03               | 3.67  | 17.17                     | 3.25  |
|                     | March     | 138.84                 | 7.36  | 20.94               | 4.18  | 18.79                     | 3.49  |
|                     | April     | 138.65                 | 6.04  | 22.15               | 3.12  | 19.75                     | 2.82  |
|                     | May       | 138.73                 | 5.83  | 21.48               | 3.30  | 19.16                     | 2.96  |
|                     | June      | 137.24                 | 7.39  | 20.19               | 4.20  | 18.21                     | 3.73  |
|                     | July      | 146.16                 | 9.68  | 24.87               | 5.85  | 22.28                     | 4.74  |
|                     | August    | 133.24                 | 11.97 | 18.53               | 6.13  | 17.01                     | 5.44  |
|                     | September | 137.08                 | 6.06  | 20.53               | 2.78  | 18.65                     | 2.53  |
|                     | October   | 142.12                 | 12.94 | 22.90               | 7.33  | 20.89                     | 6.53  |
| Cambrils (GSA 06)   | January   | 145.52                 | 7.47  | 23.14               | 4.28  | 19.50                     | 3.38  |
|                     | February  | 127.14                 | 8.24  | 13.99               | 3.30  | 13.04                     | 2.96  |
|                     | March     | 138.92                 | 10.68 | 20.14               | 5.21  | 18.17                     | 4.89  |
|                     | April     | 134.48                 | 10.91 | 20.26               | 5.96  | 17.93                     | 4.97  |
|                     | July      | 132.80                 | 7.97  | 18.61               | 3.41  | 17.00                     | 3.06  |
|                     | August    | 135.50                 | 7.63  | 19.69               | 3.40  | 17.92                     | 3.04  |
|                     | September | 137.34                 | 7.13  | 20.04               | 3.41  | 18.40                     | 3.13  |
|                     | October   | 132.13                 | 9.01  | 17.31               | 3.87  | 15.80                     | 3.44  |
|                     | November  | 145.51                 | 7.61  | 23.37               | 4.43  | 20.59                     | 3.78  |
|                     | December  | 154.84                 | 10.06 | 27.47               | 6.20  | 24.07                     | 5.16  |
| Fuengirola (GSA 01) | April     | 163.72                 | 11.08 | 38.81               | 8.22  | 34.98                     | 7.28  |
|                     | May       | 157.44                 | 19.14 | 33.90               | 11.36 | 30.81                     | 10.28 |
|                     | June      | 171.42                 | 6.11  | 44.89               | 5.05  | 40.36                     | 4.47  |
|                     | July      | 172.30                 | 8.26  | 47.66               | 6.25  | 42.34                     | 5.45  |
|                     | September | 134.15                 | 20.23 | 20.71               | 12.67 | 19.06                     | 11.54 |

|                 |        |       |       |       |       |       |
|-----------------|--------|-------|-------|-------|-------|-------|
| <b>October</b>  | 150.42 | 18.14 | 29.89 | 11.94 | 26.68 | 10.37 |
| <b>November</b> | 139.68 | 6.27  | 21.77 | 3.31  | 19.84 | 2.92  |

**Supplementary Table 2.** Mean  $\pm$  SD of lipid content, Le Cren condition (Kn) and percentage of mesenteric fat scales between gonad stage and sampling locations.

| Sampling location          | Gonad stage  | Lipid content (%) |             | Kn          |             | Mesenteric fat scale percentage (%) |              |              |              |              |              |             |
|----------------------------|--------------|-------------------|-------------|-------------|-------------|-------------------------------------|--------------|--------------|--------------|--------------|--------------|-------------|
|                            |              | Mean              | SD          | Mean        | SD          | 1                                   | 2            | 3            | 4            | 5            | 6            | 7           |
| <b>Sète (GSA 07)</b>       | <b>RT</b>    | 5.60              | 1.83        | 1.03        | 0.10        | 19.86                               | 31.59        | 25.27        | 14.26        | 6.32         | 2.53         | 0.18        |
|                            | <b>DV</b>    | 5.60              | 2.35        | 0.98        | 0.08        | 55.86                               | 5.41         | 14.41        | 12.61        | 9.01         | 2.70         | 0.00        |
|                            | <b>SC</b>    | 6.34              | 2.51        | 0.95        | 0.09        | 87.18                               | 5.13         | 7.69         | 0.00         | 0.00         | 0.00         | 0.00        |
|                            | <b>AS</b>    | 5.62              | 1.73        | 0.91        | 0.11        | 90.76                               | 7.34         | 1.90         | 0.00         | 0.00         | 0.00         | 0.00        |
|                            | <b>RG</b>    | 5.55              | 1.27        | 0.90        | 0.13        | 71.70                               | 17.45        | 7.08         | 3.77         | 0.00         | 0.00         | 0.00        |
|                            | <b>Total</b> | <b>5.62</b>       | <b>1.80</b> | <b>0.97</b> | <b>0.12</b> | <b>53.89</b>                        | <b>19.24</b> | <b>14.10</b> | <b>7.87</b>  | <b>3.50</b>  | <b>1.32</b>  | <b>0.08</b> |
| <b>Palamós (GSA 06)</b>    | <b>RT</b>    | 13.10             | 4.20        | 1.04        | 0.07        | 2.66                                | 5.80         | 9.66         | 16.43        | 27.05        | 25.60        | 12.80       |
|                            | <b>DV</b>    | 12.42             | 4.39        | 1.03        | 0.05        | 3.17                                | 7.14         | 7.14         | 13.49        | 28.57        | 30.95        | 9.52        |
|                            | <b>SC</b>    | 7.98              | 3.96        | 0.96        | 0.07        | 66.67                               | 12.82        | 2.56         | 12.82        | 2.56         | 2.56         | 0.00        |
|                            | <b>AS</b>    | 6.26              | 1.74        | 0.96        | 0.09        | 81.90                               | 8.25         | 8.25         | 1.59         | 0.00         | 0.00         | 0.00        |
|                            | <b>RG</b>    | 9.52              | 3.11        | 1.05        | 0.08        | 8.50                                | 19.17        | 35.29        | 25.93        | 8.28         | 1.96         | 0.87        |
|                            | <b>Total</b> | <b>10.08</b>      | <b>4.30</b> | <b>1.02</b> | <b>0.09</b> | <b>24.98</b>                        | <b>11.23</b> | <b>17.59</b> | <b>15.82</b> | <b>13.82</b> | <b>11.46</b> | <b>5.10</b> |
| <b>Cambrils (GSA 06)</b>   | <b>RT</b>    | 11.44             | 3.47        | 1.07        | 0.07        | 5.81                                | 2.26         | 5.81         | 12.26        | 34.84        | 31.29        | 7.74        |
|                            | <b>DV</b>    | 9.25              | 2.78        | 1.03        | 0.07        | 4.03                                | 11.41        | 18.12        | 20.81        | 18.79        | 25.50        | 1.34        |
|                            | <b>SC</b>    | 6.82              | 2.12        | 0.93        | 0.06        | 58.67                               | 19.33        | 16.67        | 3.33         | 1.33         | 0.67         | 0.00        |
|                            | <b>AS</b>    | 5.53              | 1.61        | 0.94        | 0.06        | 76.47                               | 14.29        | 7.28         | 1.68         | 0.28         | 0.00         | 0.00        |
|                            | <b>RG</b>    | 7.90              | 3.53        | 1.01        | 0.09        | 26.59                               | 25.40        | 13.89        | 13.10        | 13.89        | 7.14         | 0.00        |
|                            | <b>Total</b> | <b>8.14</b>       | <b>3.61</b> | <b>1.00</b> | <b>0.09</b> | <b>37.11</b>                        | <b>13.79</b> | <b>10.76</b> | <b>9.28</b>  | <b>14.29</b> | <b>12.64</b> | <b>2.13</b> |
| <b>Fuengirola (GSA 01)</b> | <b>RT</b>    | 10.67             | 4.38        | 1.09        | 0.08        | 0.89                                | 3.13         | 24.11        | 34.38        | 18.30        | 10.27        | 8.93        |
|                            | <b>DV</b>    | 9.53              | 4.13        | 1.06        | 0.06        | 2.19                                | 15.33        | 35.77        | 20.44        | 7.30         | 5.84         | 13.14       |
|                            | <b>SC</b>    | 12.18             | 5.16        | 1.06        | 0.06        | 0.00                                | 17.46        | 15.87        | 22.22        | 28.57        | 14.29        | 1.59        |
|                            | <b>AS</b>    | 10.78             | 3.41        | 1.06        | 0.07        | 12.50                               | 37.50        | 25.00        | 6.25         | 18.75        | 0.00         | 0.00        |
|                            | <b>RG</b>    | 12.18             | 3.70        | 1.06        | 0.07        | 0.00                                | 6.45         | 41.29        | 43.87        | 7.10         | 1.29         | 0.00        |
|                            | <b>Total</b> | <b>10.97</b>      | <b>4.33</b> | <b>1.07</b> | <b>0.07</b> | <b>1.18</b>                         | <b>9.24</b>  | <b>30.42</b> | <b>31.60</b> | <b>13.96</b> | <b>7.06</b>  | <b>6.55</b> |

## Supplementary Data

**Supplementary Data 1.** Oocyte size frequency distribution (OSFD) plots for the 70 ovaries collected during the spawning season along the Catalan coast (December and January). Via the use of the mixtools algorithm, oocytes were accurately identified with a 95% probability of belonging to the last component of the multimodal distribution in these plots.

