OIK-07332
Appendix 1.

a) Temporal range of fish samples used in study, each line representing an individual sample.

b) Age at capture frequency distribution of the different datasets.

c) Box-and-whiskers plot of annual increment measurements with lines, boxes, and whiskers representing medians, interquartile range (IQR), and 1.5 IQR, respectively. Circles represent outliers. Aqua=rosefish Portugal, beige=rosefish Madeira, brown=rosefish Azores and turquoise=rockfish Azores. Azores samples were collected during several survey cruises (1996-97 co-financed by the European
Commission, Study contracts 94/034 and 95/05 EU DG-XIV; since 1998 financed by the Azores Regional Government, Monitorização Anual das Abundâncias de Espécies Demersais e de Profundidade nos Açores).
Figure A2. Relationship between total length and otolith radius of a) rosefish and b) rockfish based on randomly selected subsets of 173 and 182 samples, respectively. Adjusted R-squared and p-values are also shown.
Table A1. Results of random effect and fixed effect model optimisation of rosefish location model. The best supported model, based on ΔAICc, is highlighted in bold. Random Age slopes for variables are denoted by “Age|variable”. df=degrees of freedom, ΔAICc = difference in AICc between a particular model and the model with the lowest AICc, wAICc=Akaike weights.

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Table A2. Results of random effect and fixed effect model optimisation of Azores species model. The best supported model, based on ΔAICc, is highlighted in bold. Random Age slopes for variables are denoted by “Age|variable”. df=degrees of freedom, ΔAICc = difference in AICc between a particular model and the model with the lowest AICc, wAICc= Akaike weights.

**Azores species model**

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Fig A3. Annual mean otolith increment of rosefish collected in Azores (brown), Madeira (beige) and Portugal (aqua) by a) age and b) age-at-capture (AAC). Vertical lines in a) and shaded area in b) denote ±95% CI.

Fig A4. Annual mean otolith increment of rosefish (brown) and rockfish (turquoise) collected in Azores by age. Vertical lines denote ±95% CI.
Fig. A5 Interannual variation of a) EAP (May-October) and temperature at depth (January-March) in b) Azores, c) Madeira and d) Portugal. These time windows were identified for the rosefish location dataset using the sliding window approach. Using the raw annual mean values (not scaled) of temperature at depth from January-March, we calculated the coefficient of variation (CV) for each location. $CV_{Azores}=2.61\%$, $CV_{Madeira}=1.81\%$, $CV_{Portugal}=2.41\%$. 
Fig. A6 Interannual variation of a) EAP (May-September) and b) NAO (May-August). These time windows were identified for the Azores species dataset using the sliding window approach.
Table A3. Results of sliding-window analysis for rosefish location model. Environmental predictors (Temp = Temperature at depth, NAO = North Atlantic Oscillation and EAP = East Atlantic pattern) were added as fixed effects to the best intrinsic model (IM; see Table A1) with varying absolute time windows. Models were fitted to the data from 1980-2016. Interaction terms are denoted by *. ΔAICc = difference in AICc between a particular model and the model with the lowest AICc; window open/close = month of identified optimal window open/close.

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<tr>
<td>IM + Age* EAP + Age* Location <em>Temp + Age</em>Location*NAO</td>
<td>2.33</td>
<td>May</td>
<td>Jul</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>
Table A4. Results of sliding-window analysis for Azores species model. Environmental predictors (Temp = Temperature at depth, NAO = North Atlantic Oscillation and EAP = East Atlantic pattern) were added as fixed effects to the best intrinsic model (IM; see Table A2) with varying absolute time windows. Models were fitted to the data from 1980-2016. Interaction terms are denoted by *. ∆AICc = difference in AICc between a particular model and the model with the lowest AICc; W open/close = month of identified optimal window open/close.

**First step of sliding window analysis**

<table>
<thead>
<tr>
<th>Model</th>
<th>∆AICc</th>
<th>W open</th>
<th>W close</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM</td>
<td>46.64</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IM + Temp</td>
<td>48.08</td>
<td>Dec</td>
<td>Dec</td>
<td>-</td>
</tr>
<tr>
<td>IM + NAO</td>
<td>46.80</td>
<td>Feb</td>
<td>Feb</td>
<td>-</td>
</tr>
<tr>
<td>IM + EAP</td>
<td>45.11</td>
<td>May</td>
<td>Jun</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age*Temp</td>
<td>38.63</td>
<td>May</td>
<td>Dec</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age*NAO</td>
<td>28.68</td>
<td>Aug</td>
<td>Aug</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age*EAP</td>
<td>39.67</td>
<td>Jun</td>
<td>Sep</td>
<td>-</td>
</tr>
<tr>
<td>IM + Species*Temp</td>
<td>49.17</td>
<td>Aug</td>
<td>Aug</td>
<td>-</td>
</tr>
<tr>
<td>IM + Species*NAO</td>
<td>40.95</td>
<td>Jun</td>
<td>Oct</td>
<td>-</td>
</tr>
<tr>
<td>IM + Species*EAP</td>
<td>31.14</td>
<td>Jan</td>
<td>Nov</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>Temp</td>
<td>17.04</td>
<td>Jun</td>
<td>Sep</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>NAO</td>
<td>9.93</td>
<td>Jul</td>
<td>Aug</td>
<td>-</td>
</tr>
<tr>
<td><strong>IM + Age<em>Species</em>EAP</strong></td>
<td><strong>0.00</strong></td>
<td>May</td>
<td>Sep</td>
<td><strong>0.024</strong></td>
</tr>
</tbody>
</table>

**Second step of sliding window analysis**

<table>
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<tr>
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<th>W open</th>
<th>W close</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM + Age<em>Species</em>EAP</td>
<td>28.28</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Temp</td>
<td>29.32</td>
<td>Jun</td>
<td>Jun</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + NAO</td>
<td>27.33</td>
<td>Feb</td>
<td>Feb</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Age*Temp</td>
<td>21.07</td>
<td>Jan</td>
<td>Oct</td>
<td>-</td>
</tr>
<tr>
<td><strong>IM + Age<em>Species</em>EAP + Age*NAO</strong></td>
<td><strong>10.40</strong></td>
<td>May</td>
<td>Aug</td>
<td><strong>0.049</strong></td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Species*Temp</td>
<td>29.27</td>
<td>Feb</td>
<td>Feb</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Species*NAO</td>
<td>23.42</td>
<td>May</td>
<td>Jul</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Age<em>Species</em>Temp</td>
<td>12.30</td>
<td>May</td>
<td>Oct</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Age<em>Species</em>NAO</td>
<td>0.00</td>
<td>May</td>
<td>Aug</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

**Third step of sliding window analysis**

<table>
<thead>
<tr>
<th>Model</th>
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<th>W open</th>
<th>W close</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM + Age<em>Species</em>EAP + Age*NAO</td>
<td>0.68</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Age*NAO + Temp</td>
<td>0.65</td>
<td>Jan</td>
<td>Jan</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Age<em>NAO + Age</em>Temp</td>
<td>0.00</td>
<td>Apr</td>
<td>Apr</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Age<em>NAO + Species</em>Temp</td>
<td>2.17</td>
<td>Jan</td>
<td>Jan</td>
<td>-</td>
</tr>
<tr>
<td>IM + Age<em>Species</em>EAP + Age<em>NAO + Age</em>Species*Temp</td>
<td>3.27</td>
<td>Feb</td>
<td>Apr</td>
<td>-</td>
</tr>
</tbody>
</table>