**Table 1.** Number of samples for each sampling site and spawning season that were collected from around the Korean peninsula, and the number of samples used for this study. Site names correspond to those in **Figure 1**. *1. Provided by Dr. Sukyung Kang, National Institute of Fisheries Science. 2. Provided by Dr. Wooseok Gwak, Gyeongsang National University.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sampling Site** | **Spawning Season** | **Tissue Samples Collected** | **Otolith Samples Collected** | **Samples Retained** |
| Yellow Sea1 | 2015-2016 | 31 | 31 | 18 |
| *Boryeong2* | *2007-2008* | *22* | *0* | *0* |
| Namhae1 | 2014-2015 | 16 | 16 | 13 |
| Geoje1 | 2013-2014 | 22 | 22 | 16 |
| Geoje1 | 2014-2015 | 34 | 34 | 30 |
| Jinhae Bay2 | 2007-2008 (Dec.) | 46 | 48 | 30 |
| Jinhae Bay2 | 2007-2008 (Feb.) | 44 | 48 | 30 |
| Pohang1 | 2014-2015 | 31 | 31 | 30 |
| *Jukbyeon2* | *2007-2008* | *35* | *0* | *0* |

**Table 2.** PERMANOVA table for test of relationships between elemental fingerprints at the edge of the otolith and (a) sampling site, (b) spawning years at Geoje, 2014 v. 2015, and (c) spawning months at Jinhae Bay, December and February.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **(a)** |  | **Degrees of Freedom** | **Sum of Squares** | **F** | **P value** |
|  | Sampling Site | 4 | 16.389 | 34.096 | 1 x 10-5 |
|  | Residual | 162 | 19.467 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **(b)** |  | **Degrees of Freedom** | **Sum of Squares** | **F** | **P value** |
|  | Year | 1 | 1.7266 | 6.4847 | 2 x 10-5 |
|  | Residual | 44 | 11.7150 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **(c)** |  | **Degrees of Freedom** | **Sum of Squares** | **F** | **P value** |
|  | Month | 1 | 2.3093 | 9.7433 | 1 x 10-5 |
|  | Residual | 58 | 13.7467 |  |  |

**Table 3.** One-way ANOVA tables for test of relationships between sampling site and elemental fingerprints at the edge of the otolith.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Degrees of freedom** | **Sum of Squares** | **Mean Sum of Squares** | **F** | **P value** |
| **Barium** | | | | | |
| Sampling site | 4 | 5.10 | 1.28 | 5.43 | 0.000394 |
| Residuals | 163 | 38.27 | 0.23 |  |  |
| **Magnesium** | | | | | |
| Sampling site | 4 | 22.73 | 5.68 | 48.13 | <2x10-16 |
| Residuals | 163 | 19.24 | 0.12 |  |  |
| **Strontium** | | | | | |
| Sampling site | 4 | 0.86 | 0.22 | 17.96 | 3.08x10-12 |
| Residuals | 163 | 1.96 | 0.01 |  |  |
| **Zinc** | | | | | |
| Sampling site | 4 | 28.48 | 7.12 | 20.59 | 9.55x10-14 |
| Residuals | 163 | 56.37 | 0.35 |  |  |

**Table 4.** One-way ANOVA tables for test of relationships between spawning year at Geoje and elemental fingerprints at the edge of the otolith.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Degrees of freedom** | **Sum of Squares** | **Mean Sum of Squares** | **F** | **P value** |
| **Barium** | | | | | |
| Spawning Year | 1 | 0.125 | 0.125 | 0.579 | 0.451 |
| Residuals | 44 | 9.52 | 0.216 |  |  |
| **Magnesium** | | | | | |
| Spawning Year | 1 | 3.05 | 3.05 | 24.83 | 1.02x10-5 |
| Residuals | 44 | 5.40 | 0.123 |  |  |
| **Strontium** | | | | | |
| Spawning Year | 1 | 0.034 | 0.034 | 2.592 | 0.115 |
| Residuals | 44 | 0.574 | 0.013 |  |  |
| **Zinc** | | | | | |
| Spawning Year | 1 | 0.002 | 0.002 | 0.005 | 0.944 |
| Residuals | 44 | 17.93 | 0.408 |  |  |

**Table 5.** One-way ANOVA tables for test of relationships between spawning months at Jinhae Bay and elemental fingerprints at the edge of the otolith.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Degrees of freedom** | **Sum of Squares** | **Mean Sum of Squares** | **F** | **P value** |
| **Barium** | | | | | |
| Spawning Month | 1 | 4.68 | 4.68 | 27.33 | 2x10-6 |
| Residuals | 59 | 10.10 | 0.171 |  |  |
| **Magnesium** | | | | | |
| Spawning Month | 1 | 0.109 | 0.109 | 1.15 | 0.288 |
| Residuals | 59 | 5.59 | 0.095 |  |  |
| **Strontium** | | | | | |
| Spawning Month | 1 | 0.019 | 0.019 | 1.53 | 0.22 |
| Residuals | 59 | 0.737 | 0.012 |  |  |
| **Zinc** | | | | | |
| Spawning Month | 1 | 0.337 | 0.337 | 0.798 | 0.375 |
| Residuals | 59 | 24.90 | 0.422 |  |  |

**Table 8.** Stress values from NMDS of edge data, with (a) full data set, and (b) excluding Pohang.

|  |  |
| --- | --- |
| **Dimensions (K)** | **Stress Value** |
| 1 | 0.2559 |
| 2 | 0.1422 |
| 3 | 0.0934 |
| 4 | 0.0609 |
| 5 | 0.0390 |
| 6 | 0.0255 |
| 7 | 0.0122 |

**Table 9.** Stress values from NMDS of core data.

|  |  |
| --- | --- |
| **Dimensions (K)** | **Stress Value** |
| 1 | 0.2478 |
| 2 | 0.1372 |
| 3 | 0.0933 |
| 4 | 0.0656 |
| 5 | 0.0401 |
| 6 | 0.0240 |
| 7 | 0.0105 |

* Note: used k=3 for best viz because stress still below 0.10