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

**Table 2.** PERMANOVA table for test of relationships between sampling site and elemental fingerprints at the edge of the otolith.

**Table 3.** PERMANOVA table for test of relationships between spawning years at Geoje (2014 v. 2015) and elemental fingerprints at the edge of the otolith.

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

**Table 4.** PERMANOVA table for test of relationships between spawning months at Jinhae Bay (November, early season, v. late) and elemental fingerprints at the edge of the otolith.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Degrees of Freedom** | **Sum of Squares** | **F** | **P value** |
| Spawning month | 1 | 2.3093 | 9.7433 | 1 x 10-5 |
| Residual | 58 | 13.7467 |  |  |

**Table 5.** 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 6.** 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 7.** 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.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **(a)** | **Dimensions (K)** | **Stress Value** | **(b)** | **Dimensions (K)** | **Stress Value** |
|  | 1 | 0.2559 |  | 1 | 0.3034 |
|  | 2 | 0.1422 |  | 2 | 0.1678 |
|  | 3 | 0.0934 |  | 3 | 0.1124 |
|  | 4 | 0.0609 |  | 4 | 0.0779 |
|  | 5 | 0.0390 |  | 5 | 0.0522 |
|  | 6 | 0.0255 |  | 6 | 0.0304 |
|  | 7 | 0.0122 |  |  |  |

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

**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