**Supplementary Material**

At-sea distribution and habitat of breeding Japanese Murrelets *Synthliboramphus wumizusume:* implications for conservation management

MARK G. R. MILLER, YUTAKA YAMAMOTO, MAYUMI SATO, BEN LASCELLES, YUTAKA NAKAMURA, HITOSHI SATO, YASUHIRO ANDO, ITSURO EZAKI, PHIL TAYLOR, SHIGEAKI MORI, SEIJI HAYAMA, YUTAKA KOBAYASHI

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Table S1. Details of oceanographic variables used in modelling.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable code | Variable | Type | Source | Layers created |
| SST | Sea Surface Temperature | Dynamic oceanographic | MODIS Aqua Terra; http://oceancolor.gsfc.nasa.gov/ | 5 (one per year: 2008-2012) |
| CHLA | Chlorophyll-a Concentration | Dynamic oceanographic | MODIS Aqua Terra; http://oceancolor.gsfc.nasa.gov/ | 14 (one per survey) |
| G\_SST | SST gradient | Dynamic oceanographic - derived | MODIS Aqua Terra; http://oceancolor.gsfc.nasa.gov/ | 5 (one per year: 2008-2012) |
| G\_CHLA | Chlorophyll-a gradient | Dynamic oceanographic – derived | MODIS Aqua Terra; http://oceancolor.gsfc.nasa.gov/ | 14 (one per survey) |
| Bathy | Bathymetry | Static | GEBCO; http://www.gebco.net/ | 1 |
| Slope | Seabed slope angle | Static - derived | GEBCO; http://www.gebco.net/ | 1 |
| D\_Land | Distance to land | Static - derived | GEBCO; http://www.gebco.net/ | 1 |
| D\_Col | Distance to colony | Static - derived | Survey data | 1 |

Table S2. Names and locations of all known Japanese Murrelet colonies within Japan, coordinates not disclosed for Seinan colonies for conservation purposes.

|  |  |  |  |
| --- | --- | --- | --- |
| Location (Island/Islet) | Latitude | Longitude | Region |
| Nanatsujima Oshima | 37.61028791 | 136.9002056 | Chubu |
| Nanatsujima Aramikojima | 37.58873089 | 136.876688 | Chubu |
| Kutsujima | 35.70024392 | 135.4452896 | Chubu |
| Udonejima | 34.47189184 | 139.294281 | Northern Izu |
| Niijima | 34.43069985 | 139.2795181 | Northern Izu |
| Hanshima | 34.32571722 | 139.2772865 | Northern Izu |
| Tadanaejima | 34.20768528 | 139.1914558 | Northern Izu |
| Onbasejima | 34.18695586 | 139.0754986 | Northern Izu |
| Onoharajima (Sanbondake) | 34.048056 | 139.383889 | Northern Izu |
| Motone | 33.851028 | 139.62001 | Northern Izu |
| Kojine | 33.12993056 | 139.6986361 | Central Izu |
| Torishima | 30.48344429 | 140.2885437 | Southern Izu |
| Mimianajima | 34.18393831 | 136.3799429 | Kansai |
| Okinoshima koyajima | 34.23146103 | 130.1111698 | Kyushu |
| Eboshijima | 33.68963859 | 129.9828529 | Kyushu |
| Biroujima | 32.46472948 | 131.7308807 | Kyushu |
| Danjogunto hanaguri | 32.01127832 | 128.3615112 | Kyushu |
| Tsukuejima | 33.68333333 | 130.2166667 | Kyushu |
| Oki | 36.154 | 133.073 | Oki |
| Seinan 1 | - | - | Shikoku |
| Seinan 2 | - | - | Chuugoku |
| Takeshima /Dok | 37.239167 | 131.868611 | Japan/South Korea (disputed) |

Figure S3. Bimodal distribution of Japanese Murrelet density (birds/km2) in relation to distance from colony (D\_COL, km) around Northern Izu colonies. A clear break in murrelet observations is observed at 20km distance from colonies in both March (pink) and May (blue).

