



Supplement of

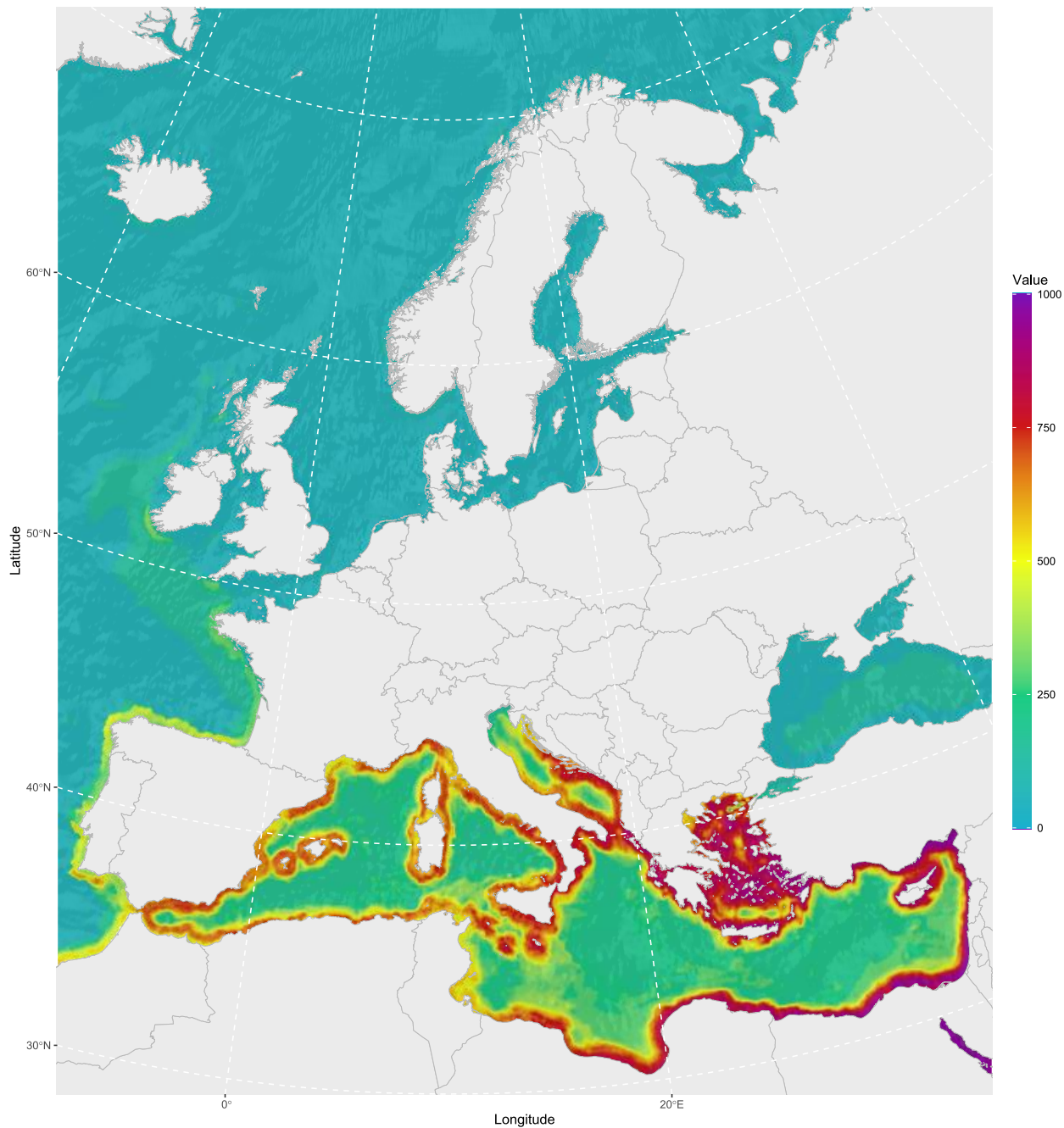
The effects of climate change on European distributions of four alien marine crab species

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S1. Habitat suitability maps under current climatic conditions



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Fig. S1 Predicted habitat suitability of *Charybdis longicollis* under current climatic conditions.

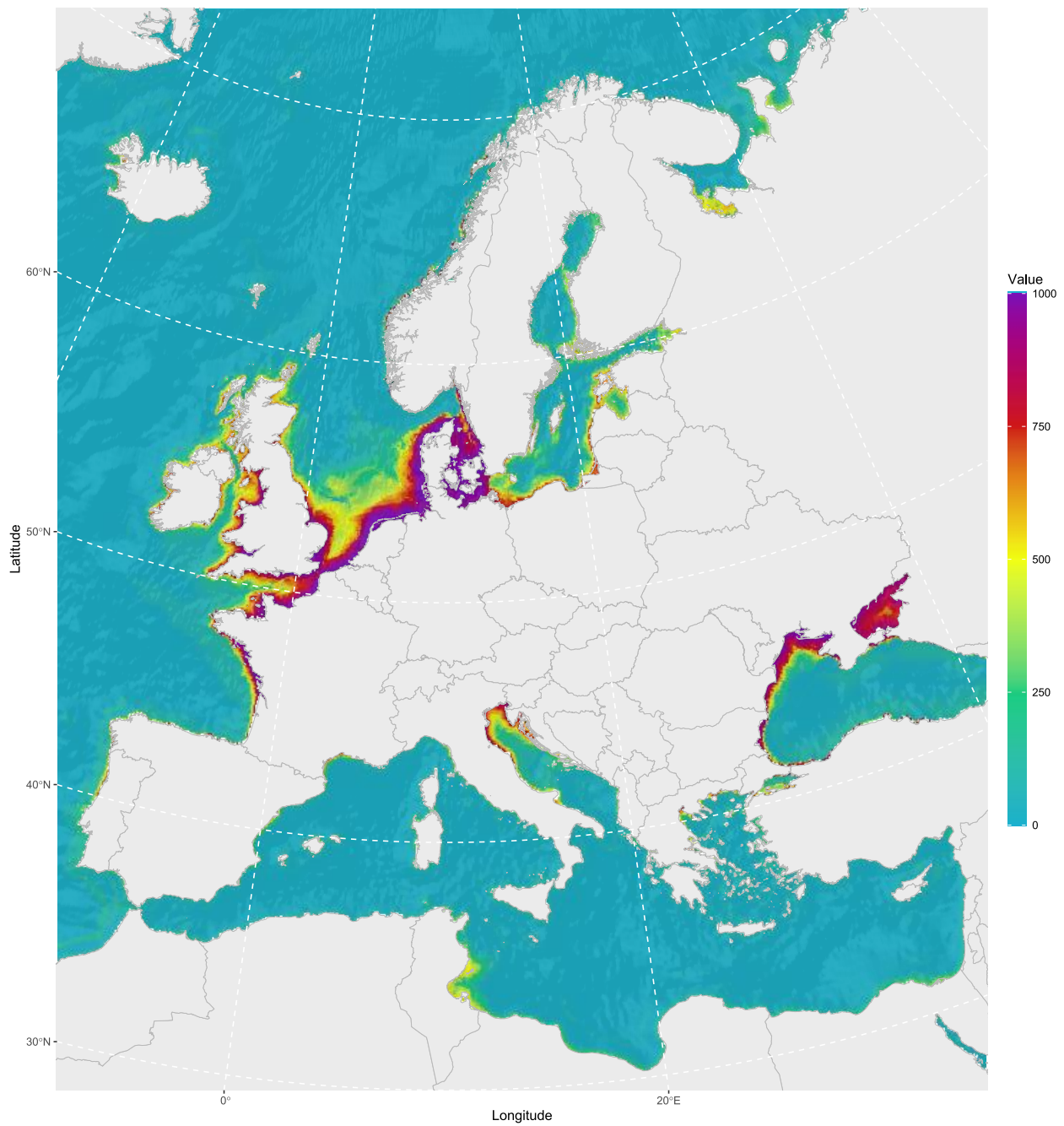
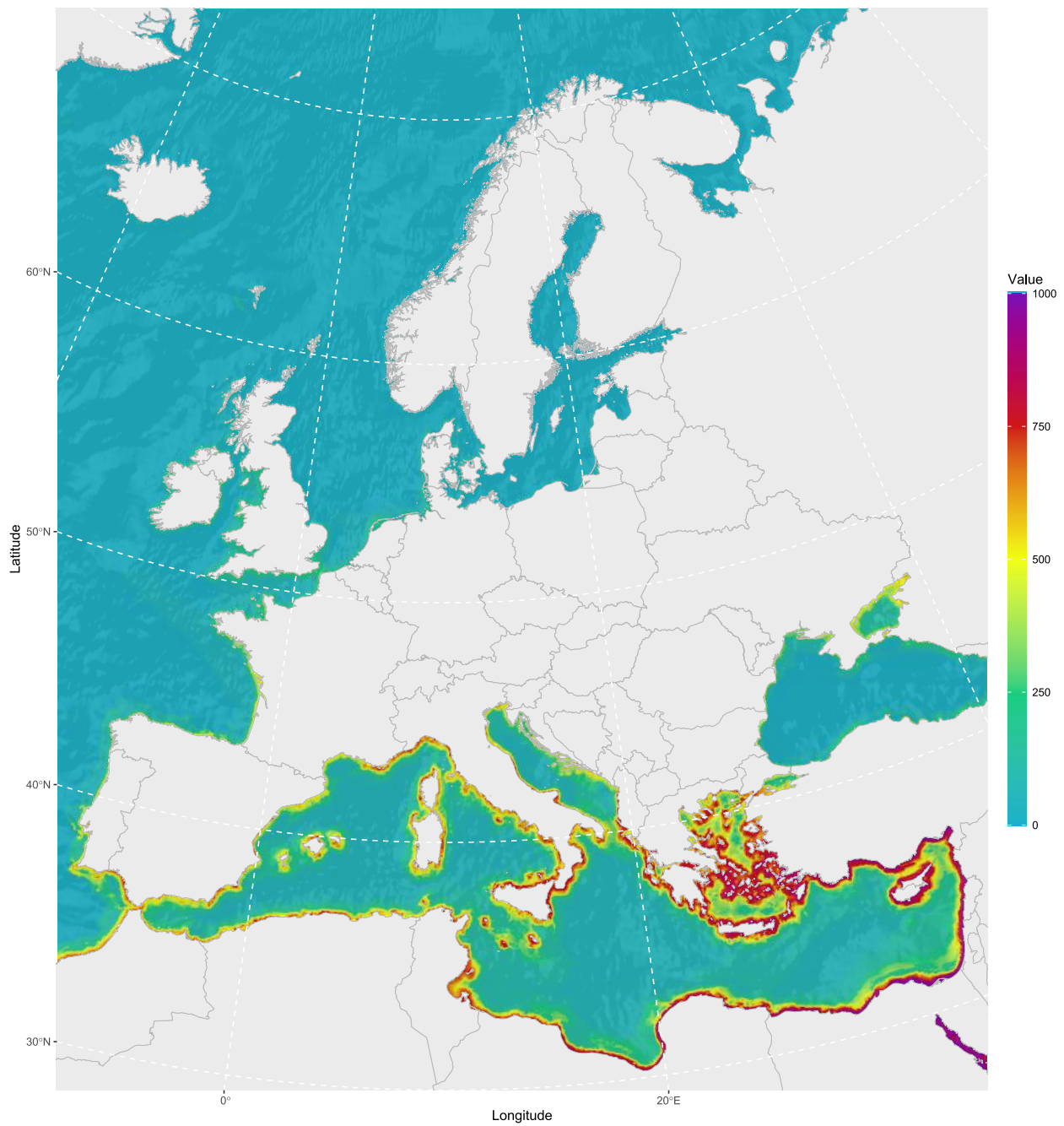


Fig. S2 Predicted habitat suitability of *Hemigrapsus sanguineus* under current climatic conditions.



20 **Fig. S3 Predicted habitat suitability of *Matuta victor* under current climatic conditions.**

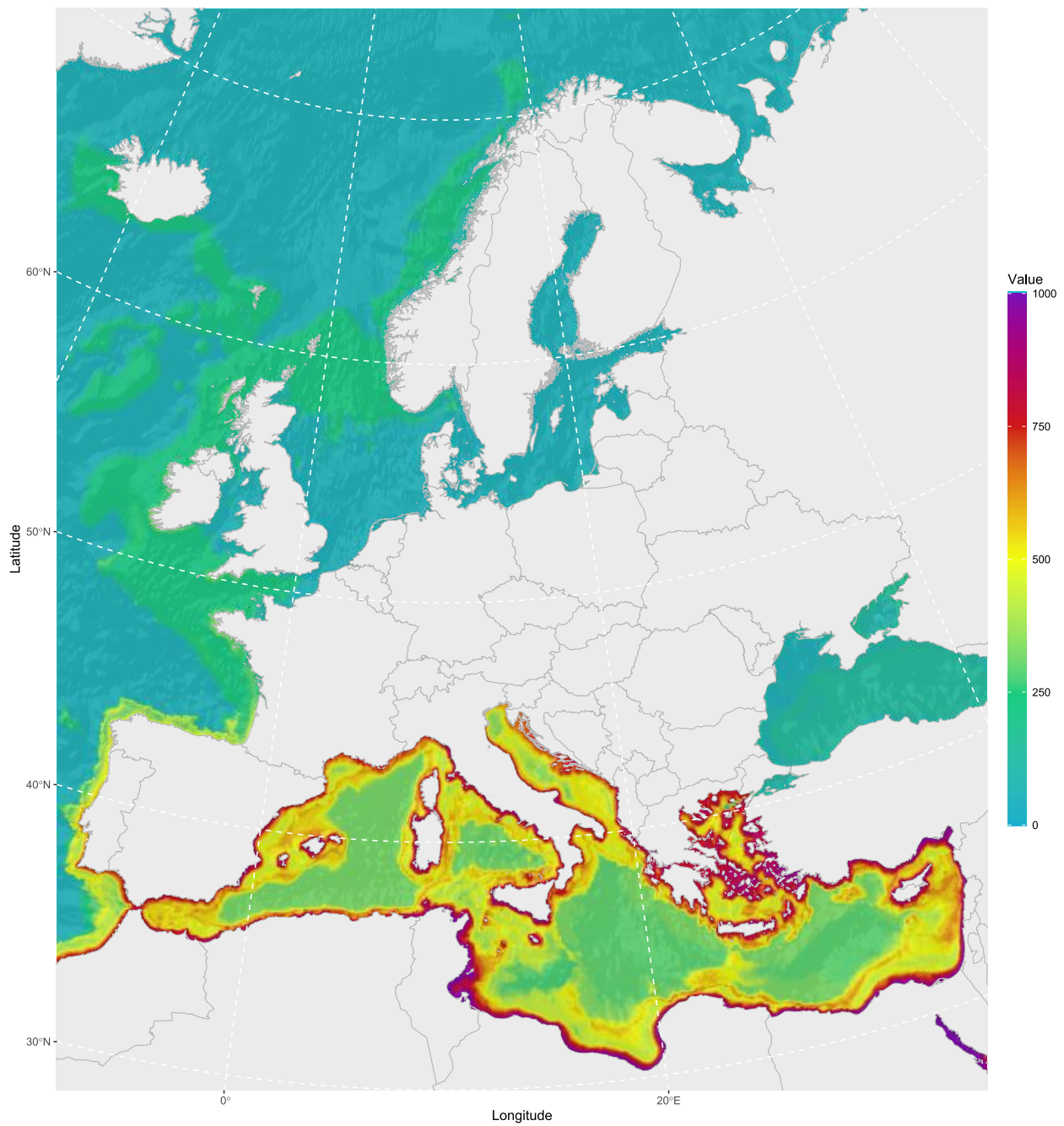


Fig. S4 Predicted habitat suitability of *Portunus segnis* under current climatic conditions.

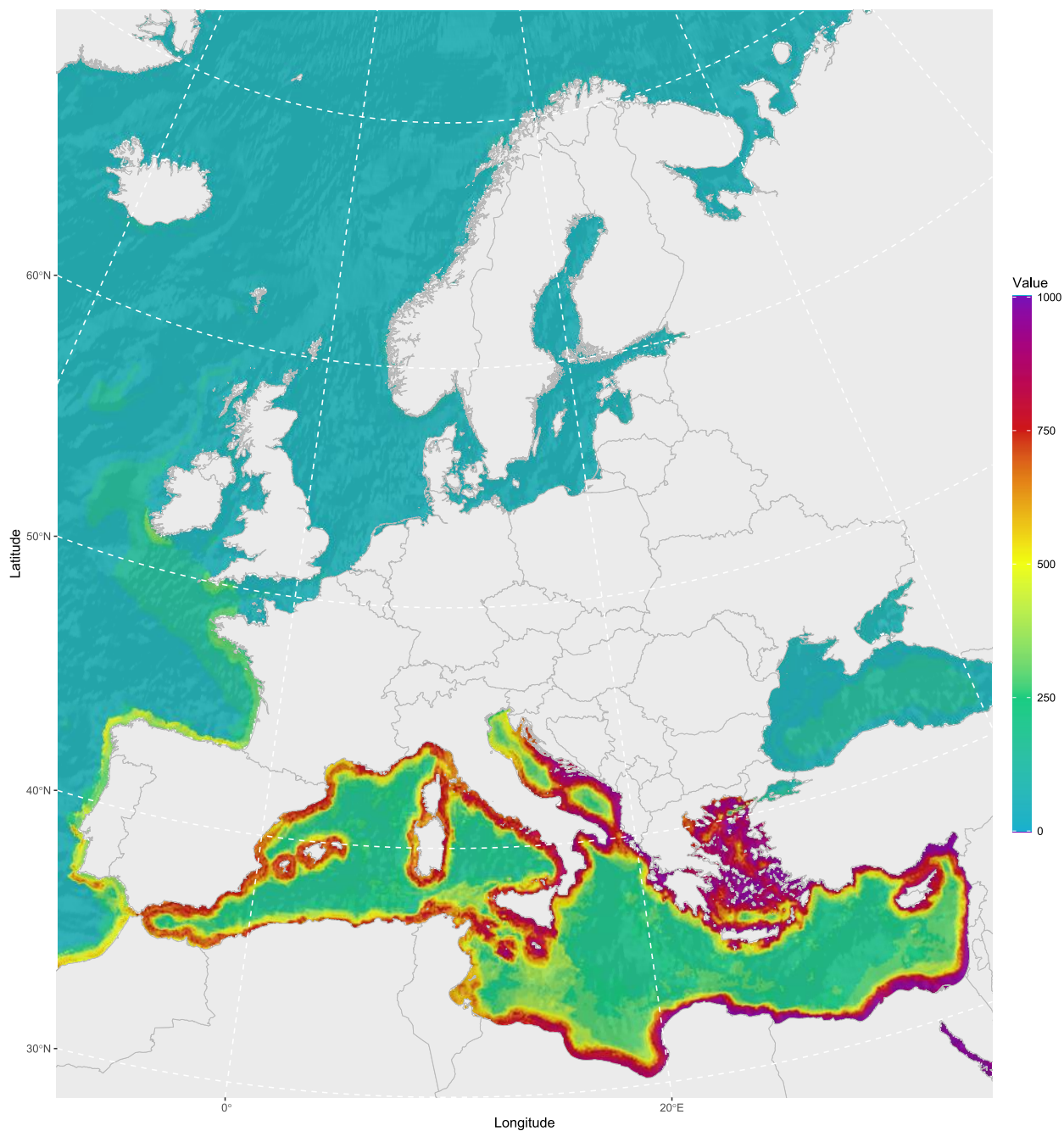
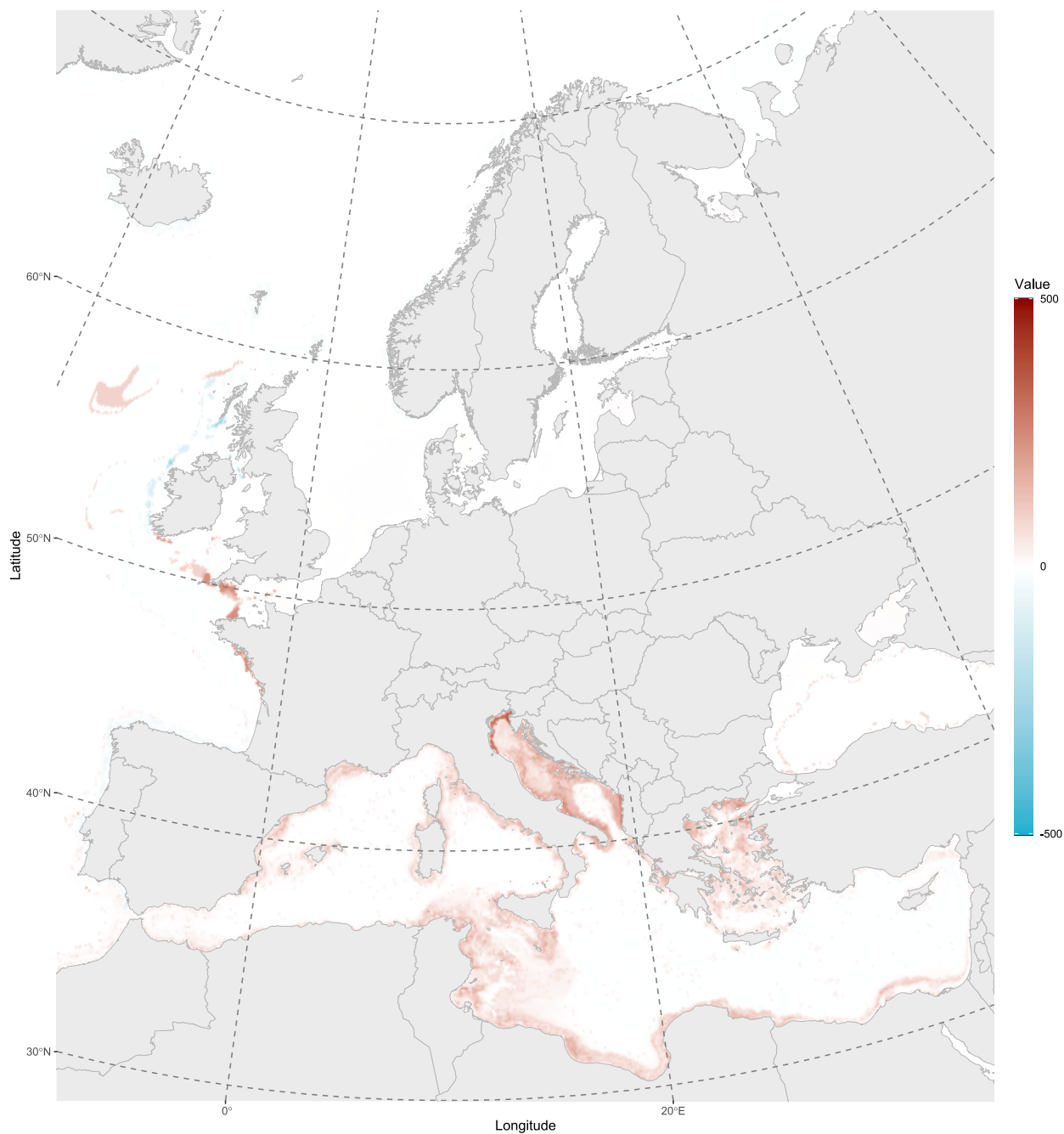
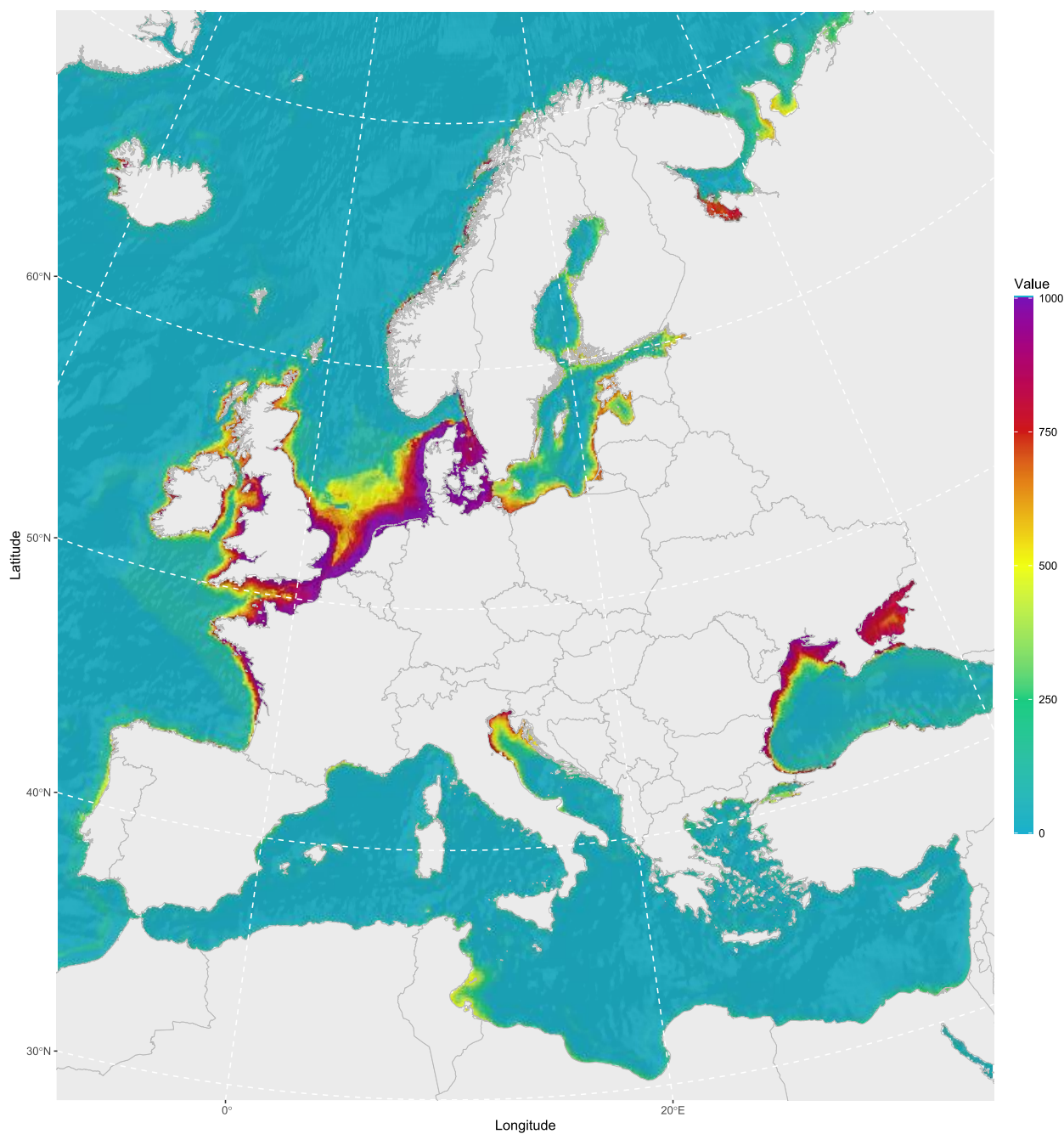


Fig. S5 Predicted habitat suitability of *Charybdis longicollis* under RCP2.6 in the year 2050.

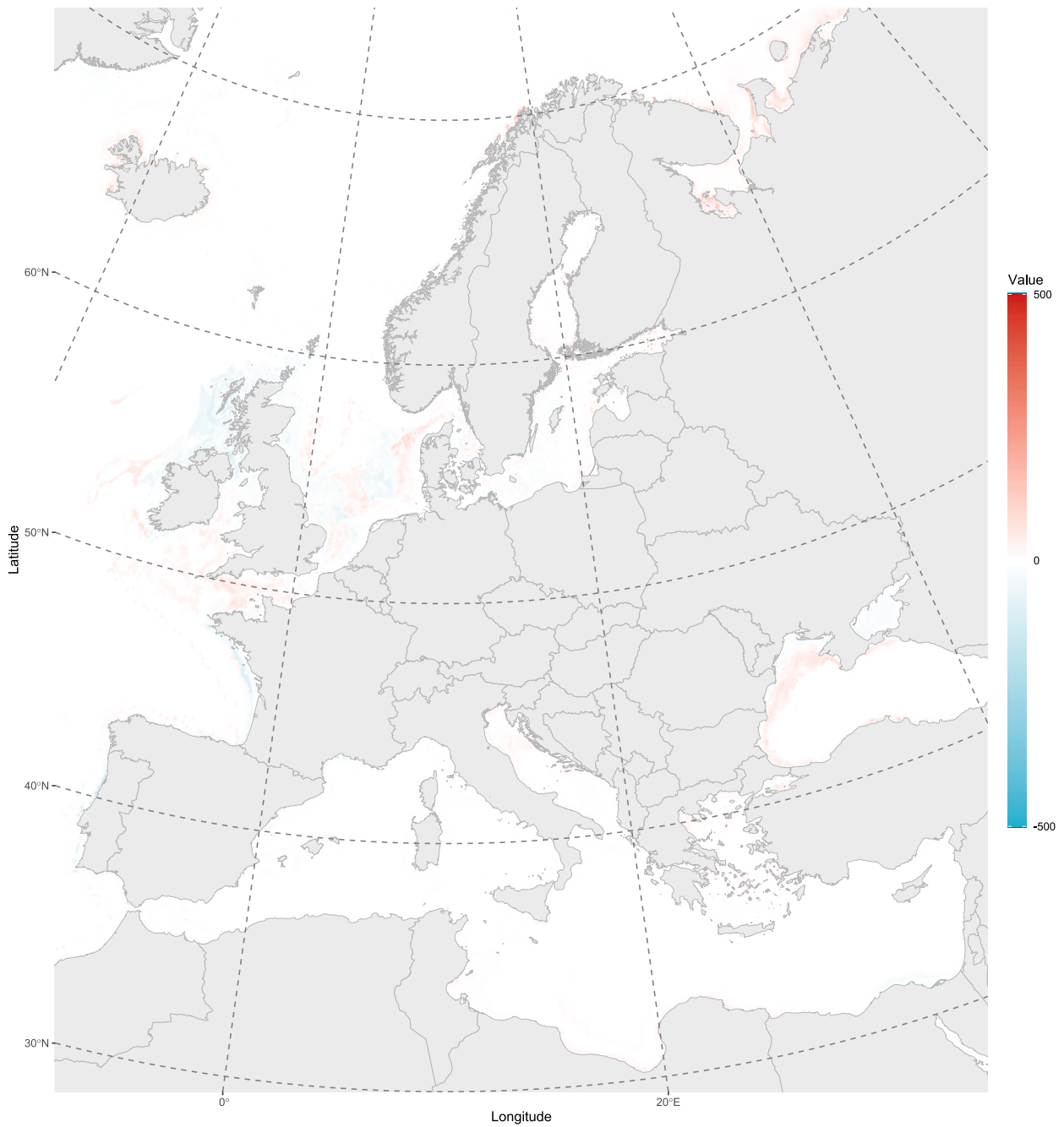


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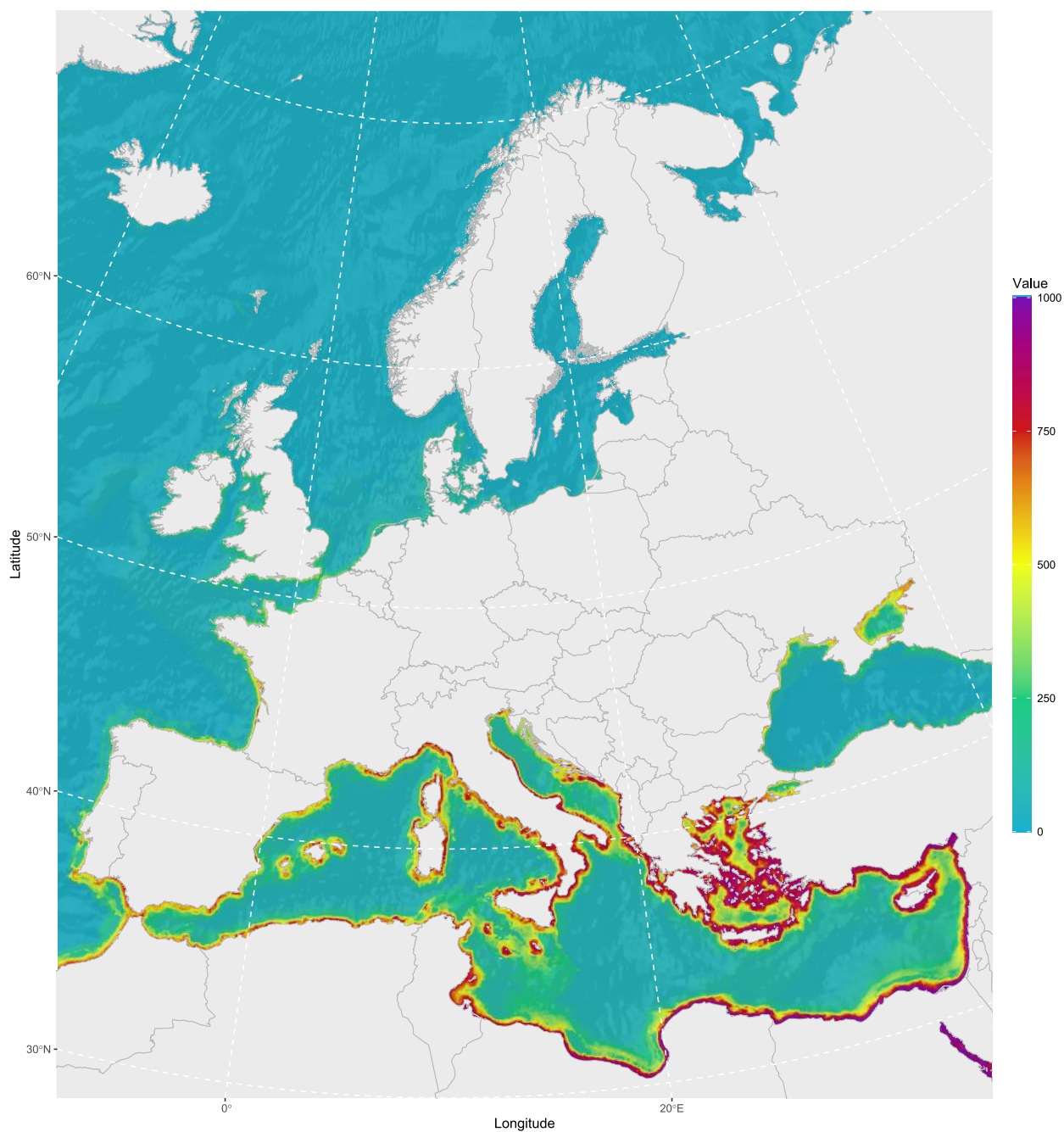
Fig. S6 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Charybdis longicollis* under RCP2.6 in the year 2050.



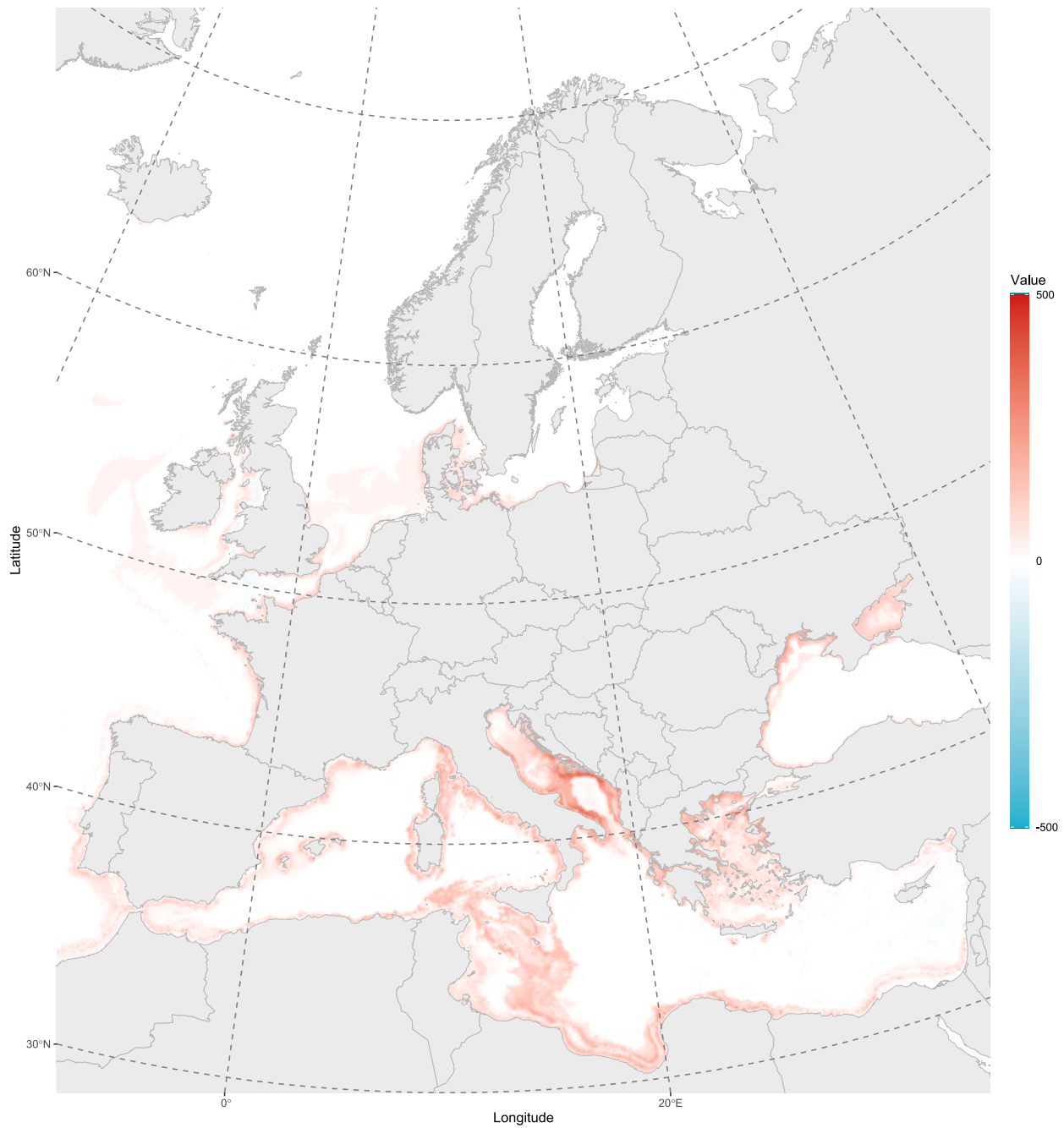
35 **Fig. S7 Predicted habitat suitability of *Hemigrapsus sanguineus* under RCP2.6 in the year 2050.**



40 **Fig. S8** Difference between current predicted habitat suitability and the future predicted habitat suitability of *Hemigrapsus sanguineus* under RCP2.6 in the year 2050.



45 Fig. S9 Predicted habitat suitability of *Matuta victor* under RCP2.6 in the year 2050.



50 **Fig. S10 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Matuta victor* under RCP2.6 in the year 2050.**

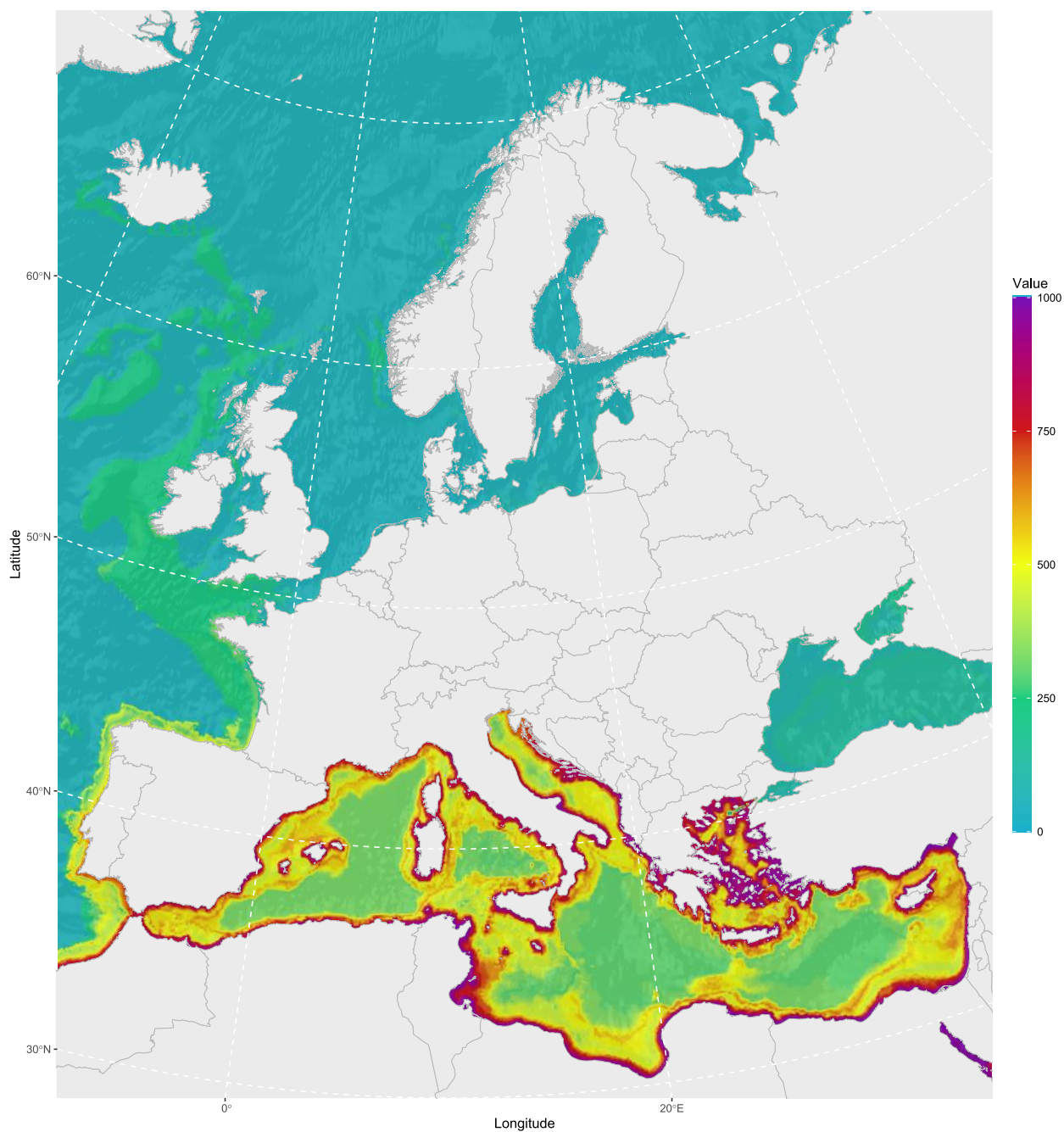


Fig. S11 Predicted habitat suitability of *Portunus signis* under RCP2.6 in the year 2050.

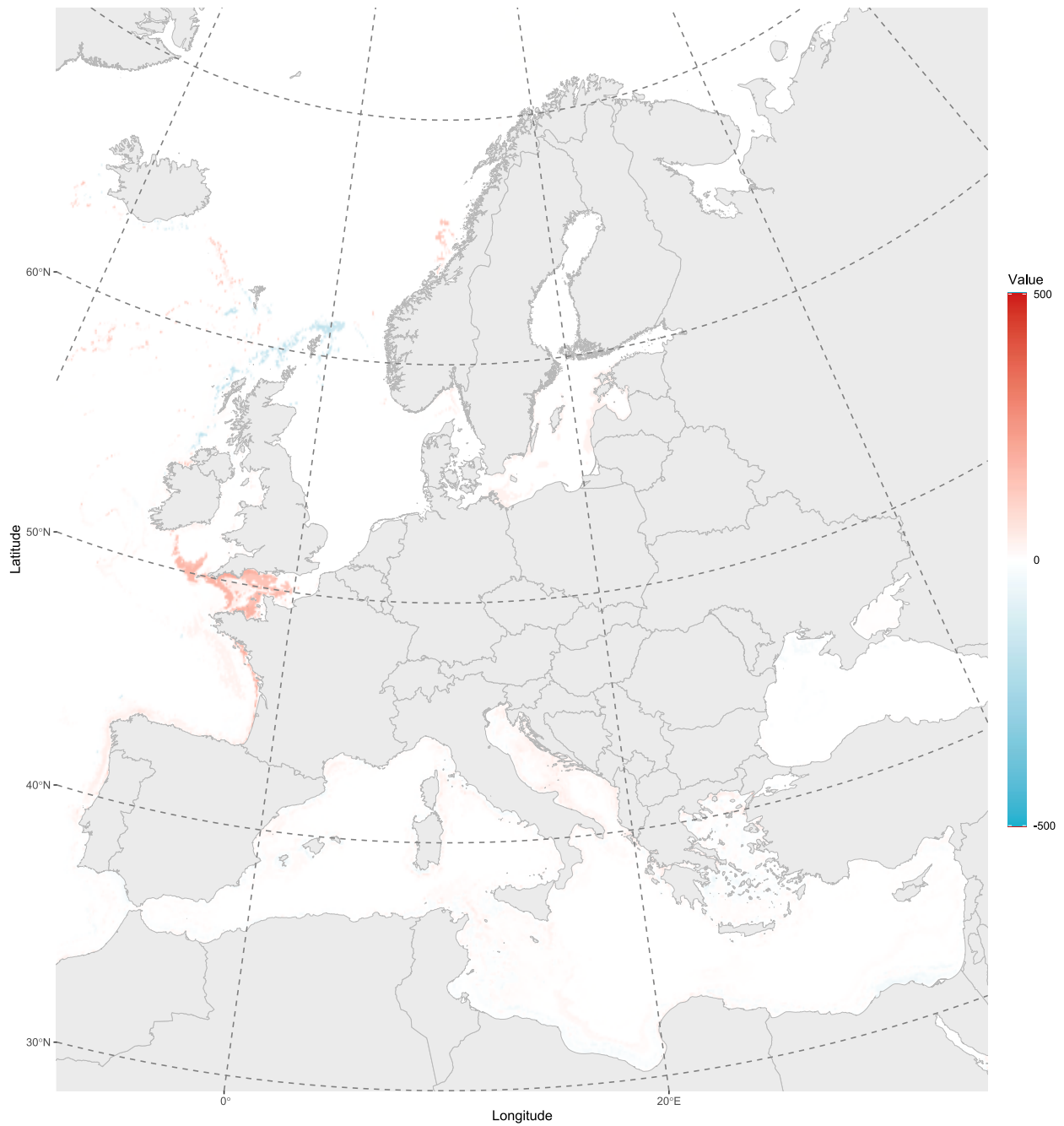


Fig. S12 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Portunus signis* under RCP2.6 in the year 2050.

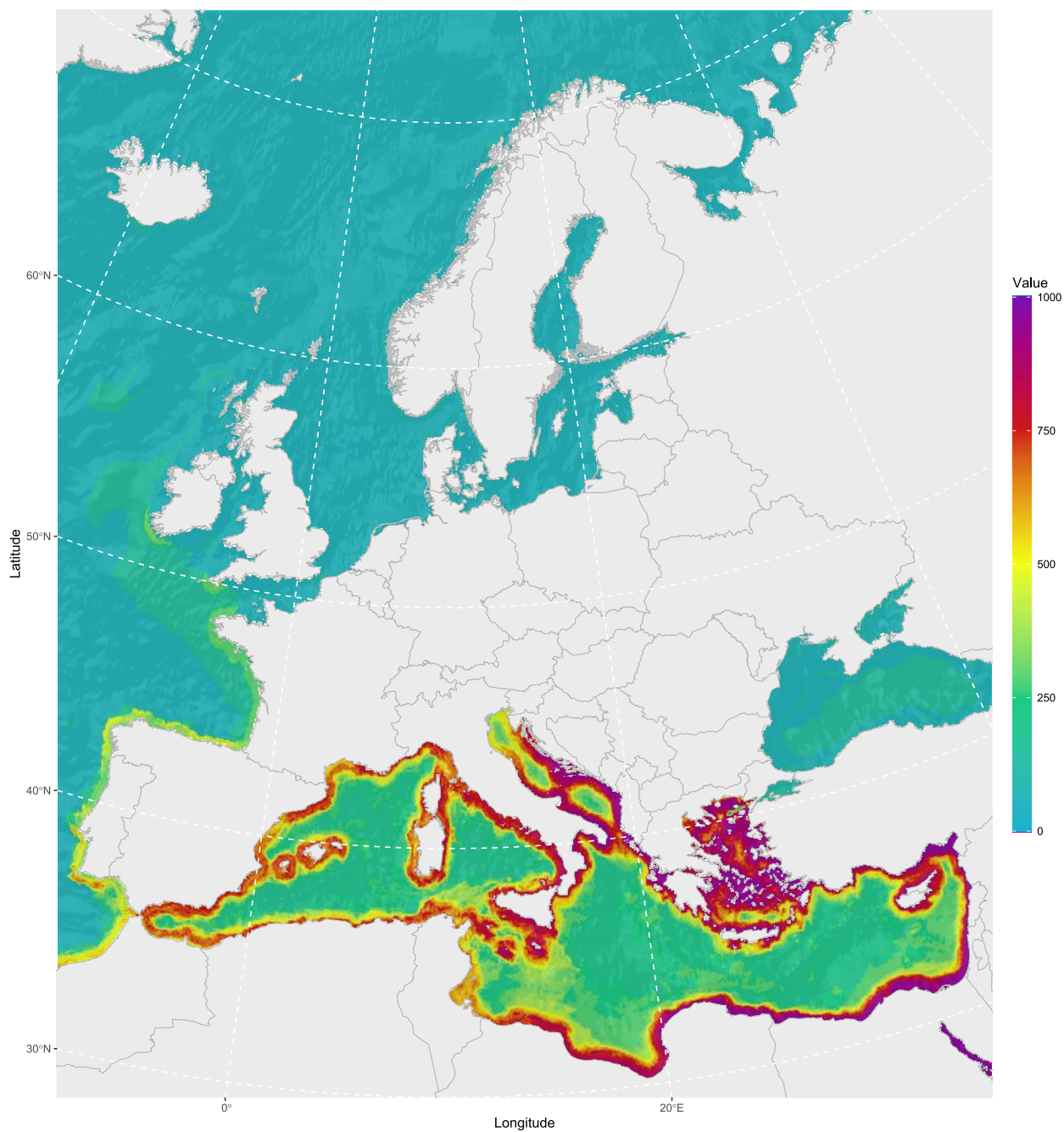


Fig. S13 Predicted habitat suitability of *Charybdis longicollis* under RCP4.5 in the year 2050.

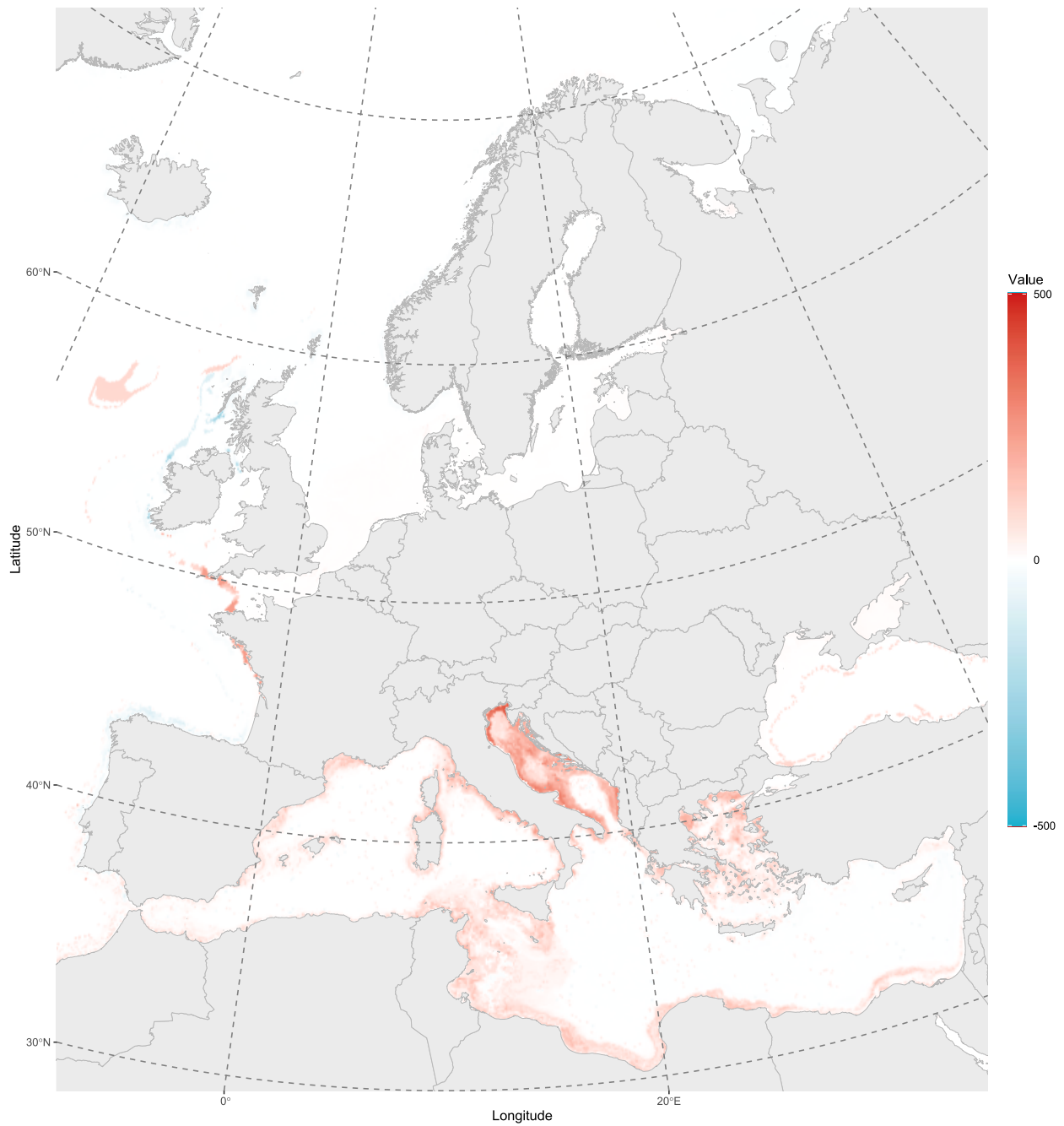


Fig. S14 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Charybdis longicollis* under RCP4.5 in the year 2050.

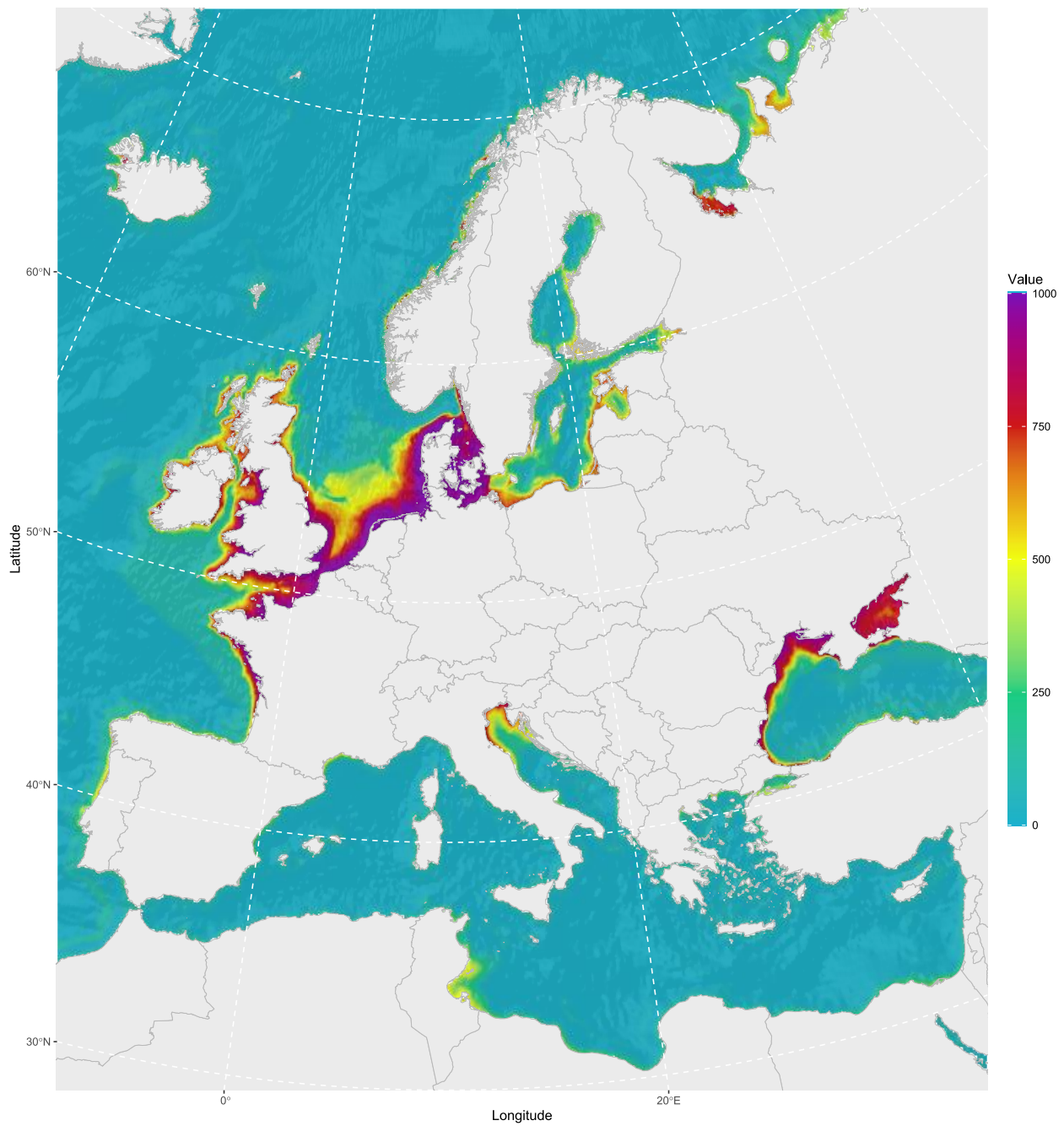
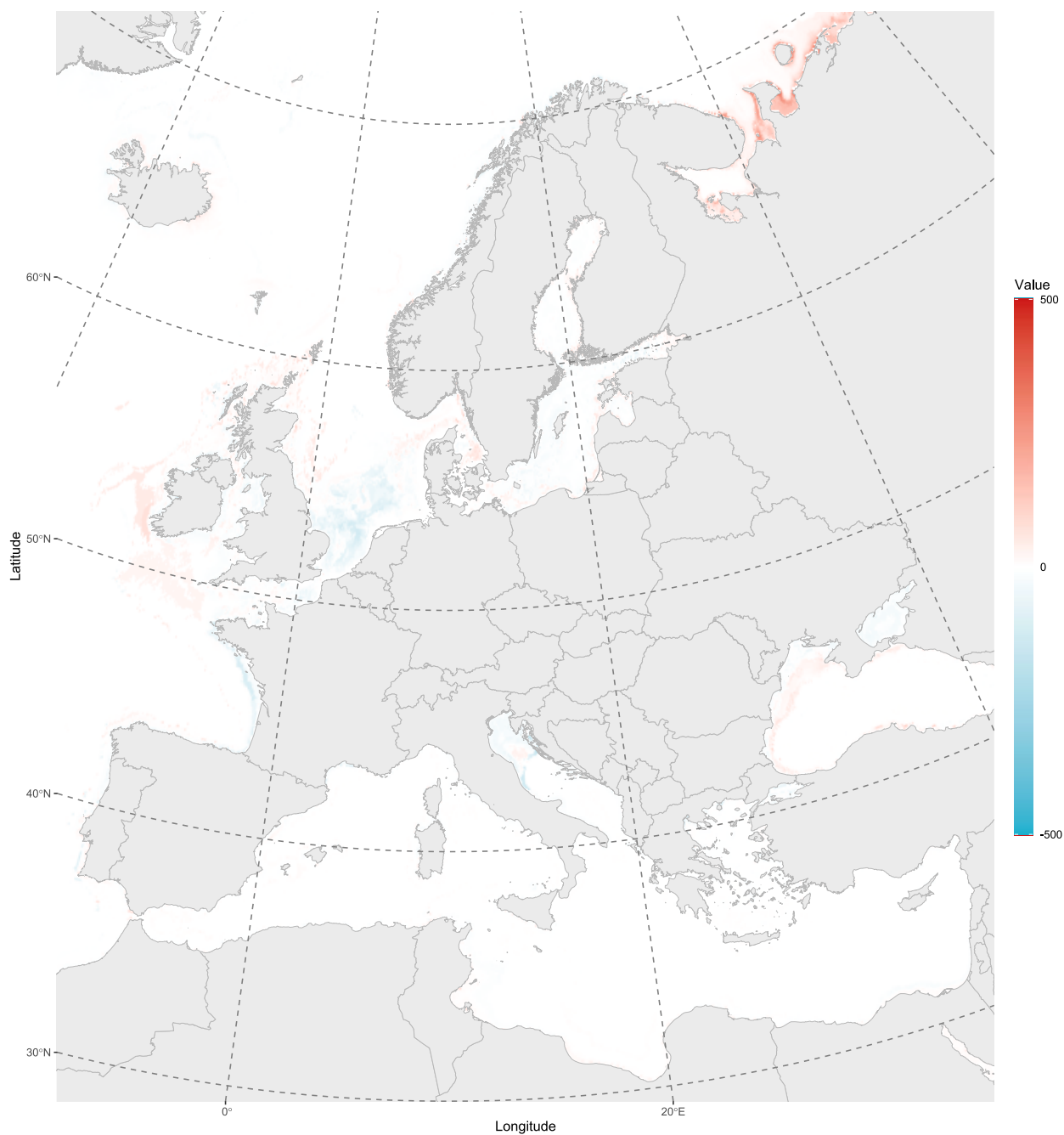


Fig. S15 Predicted habitat suitability of *Hemigrapsus sanguineus* under RCP4.5 in the year 2050.



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Fig. S16 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Hemigrapsus sanguineus* under RCP4.5 in the year 2050.

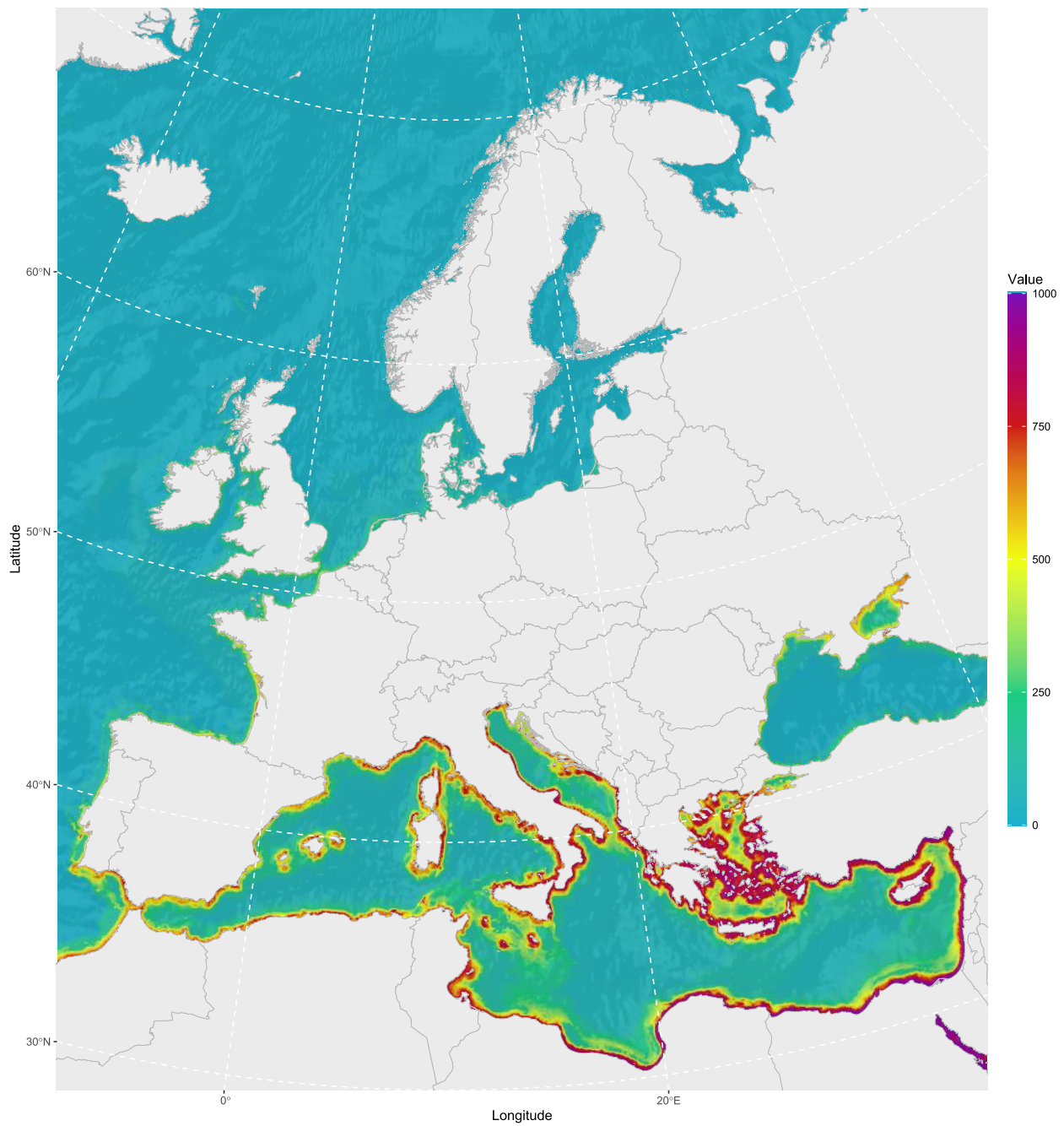


Fig. S17 Predicted habitat suitability of *Matuta victor* under RCP4.5 in the year 2050.

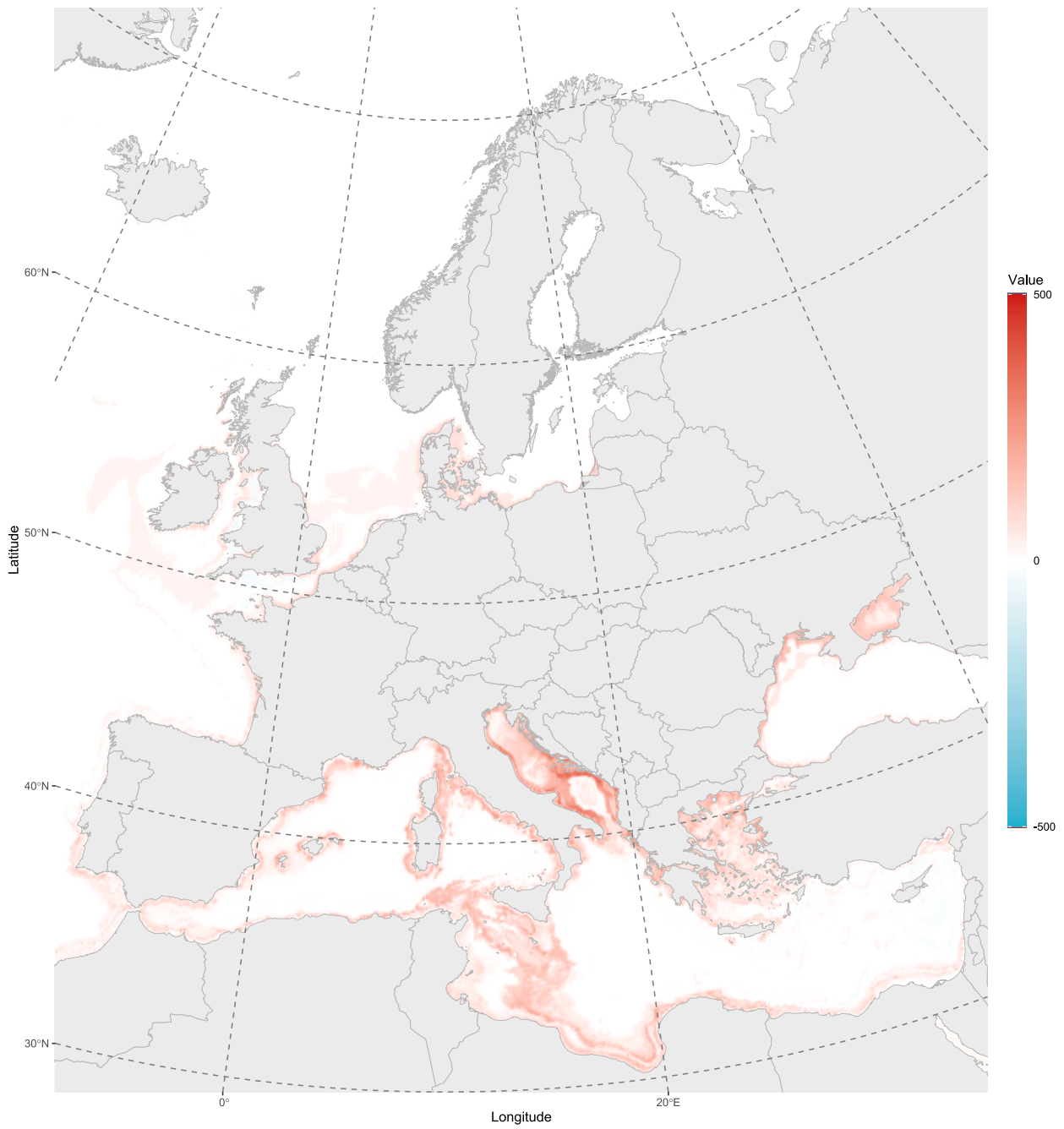


Fig. S18 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Matuta victor* under RCP4.5 in the year 2050.

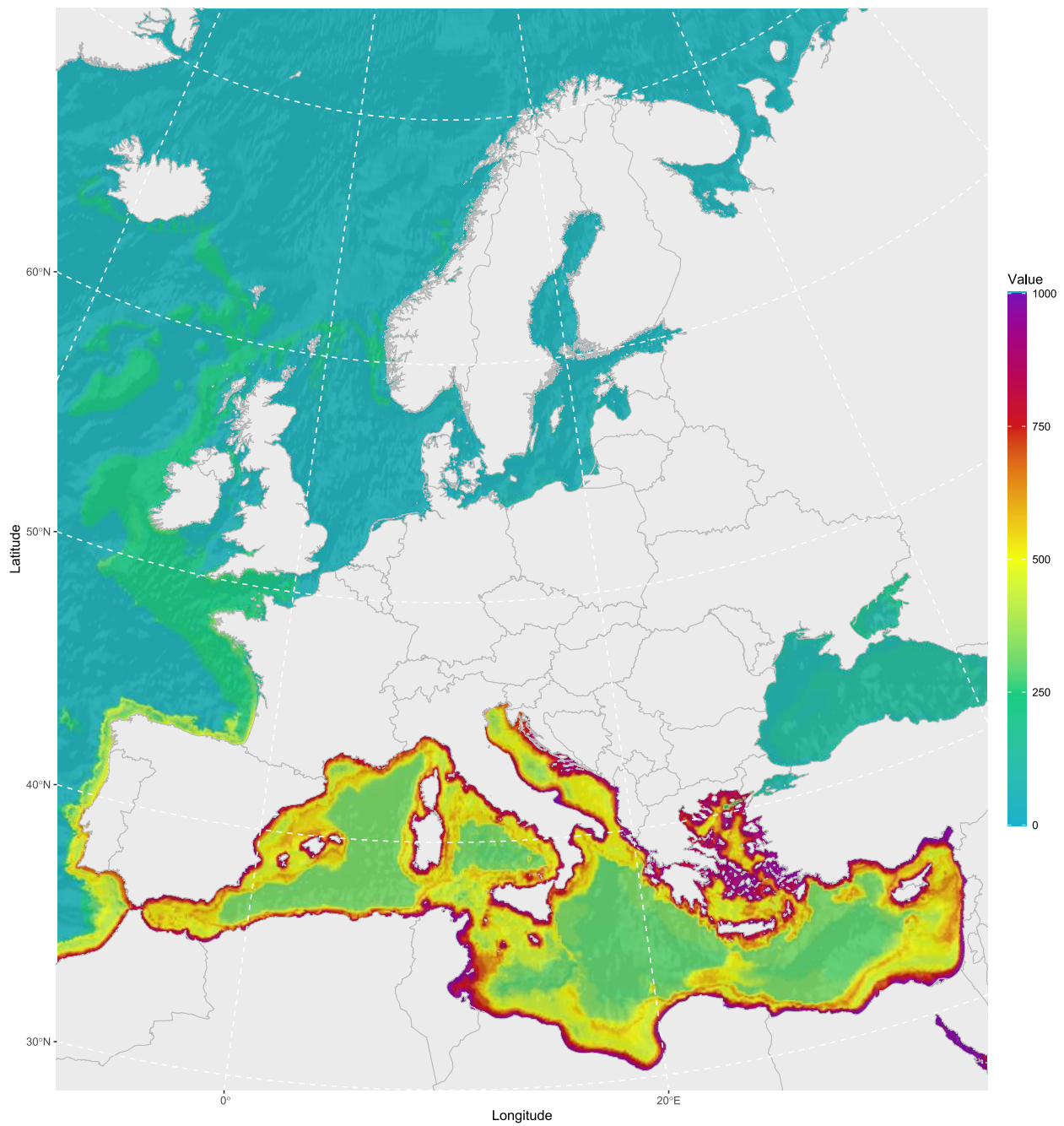


Fig. S19 Predicted habitat suitability of *Portunus signis* under RCP4.5 in the year 2050.

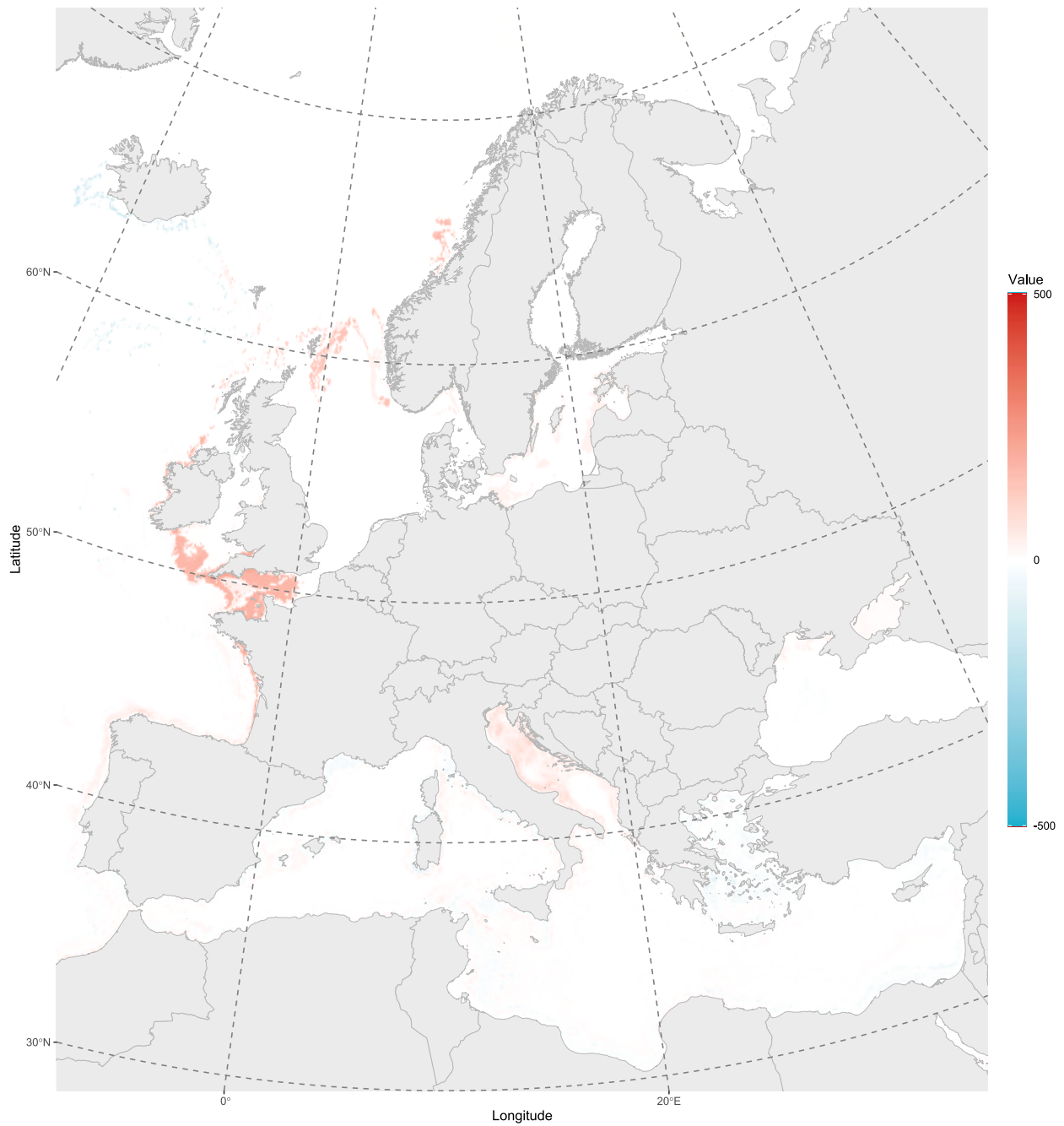


Fig. S20 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Portunus signis* under RCP4.5 in the year 2050.

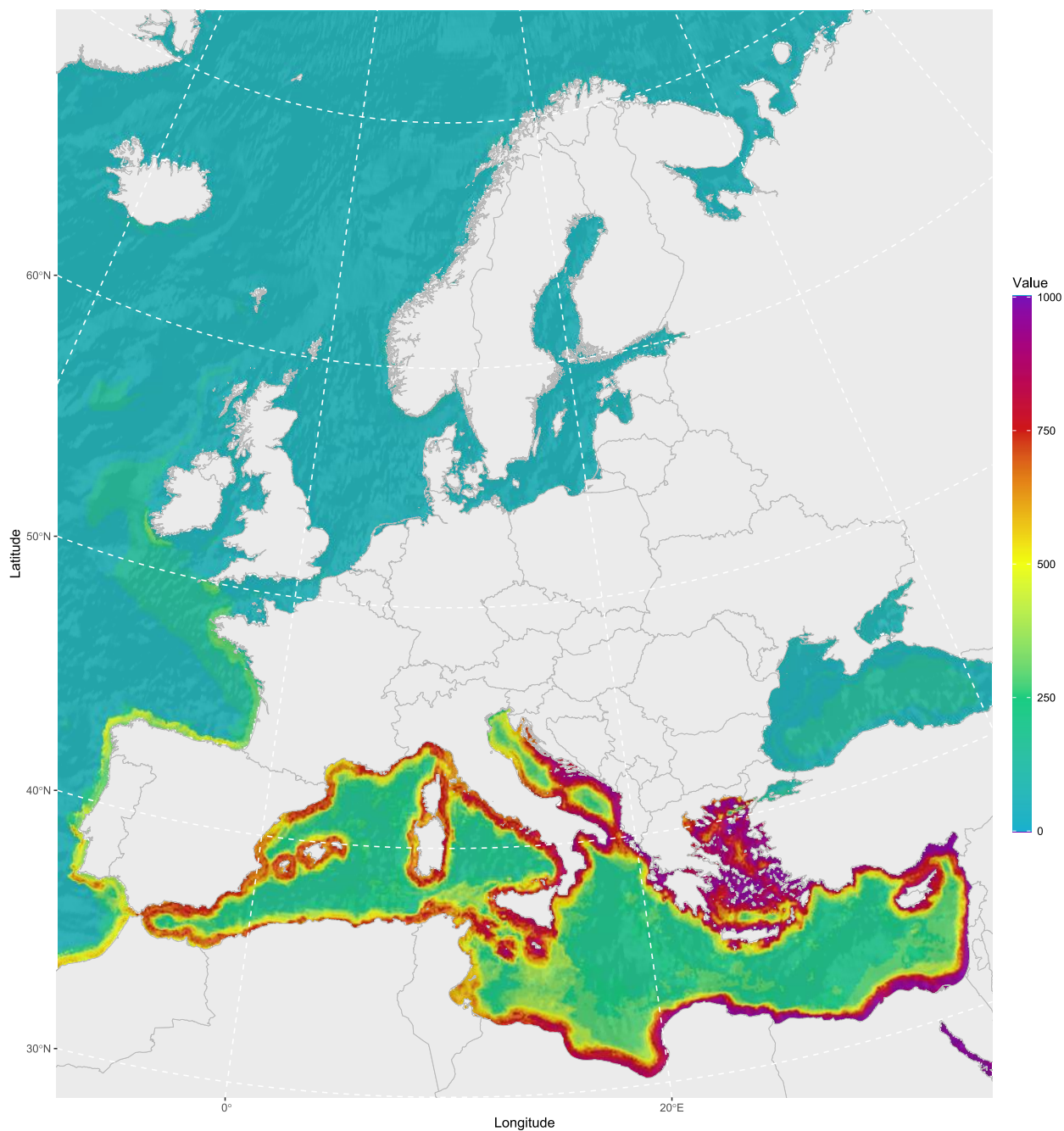


Fig. S21 Predicted habitat suitability of *Charybdis longicollis* under RCP6.0 in the year 2050.

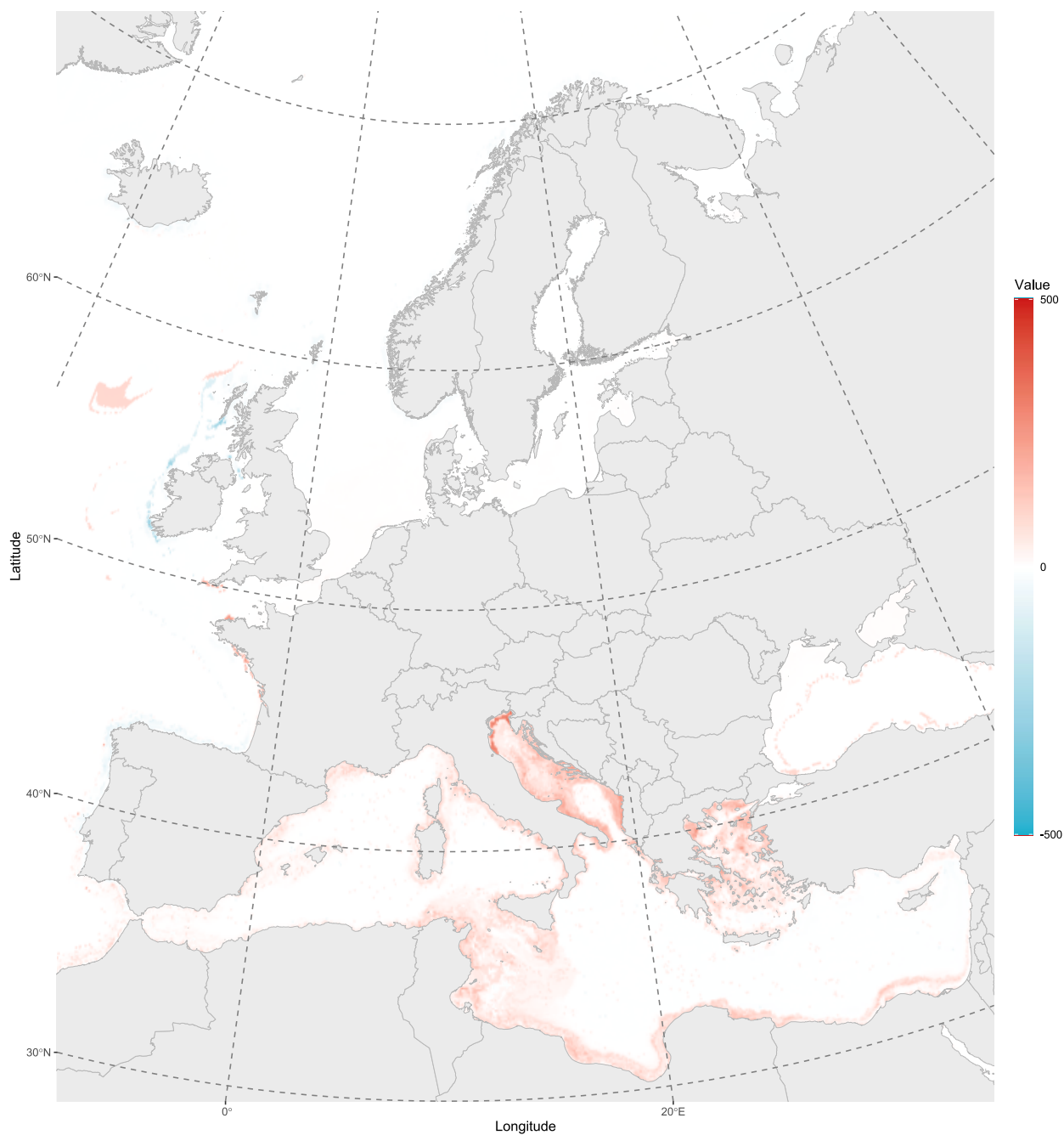


Fig. S22 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Charybdis longicollis* under RCP6.0 in the year 2050.

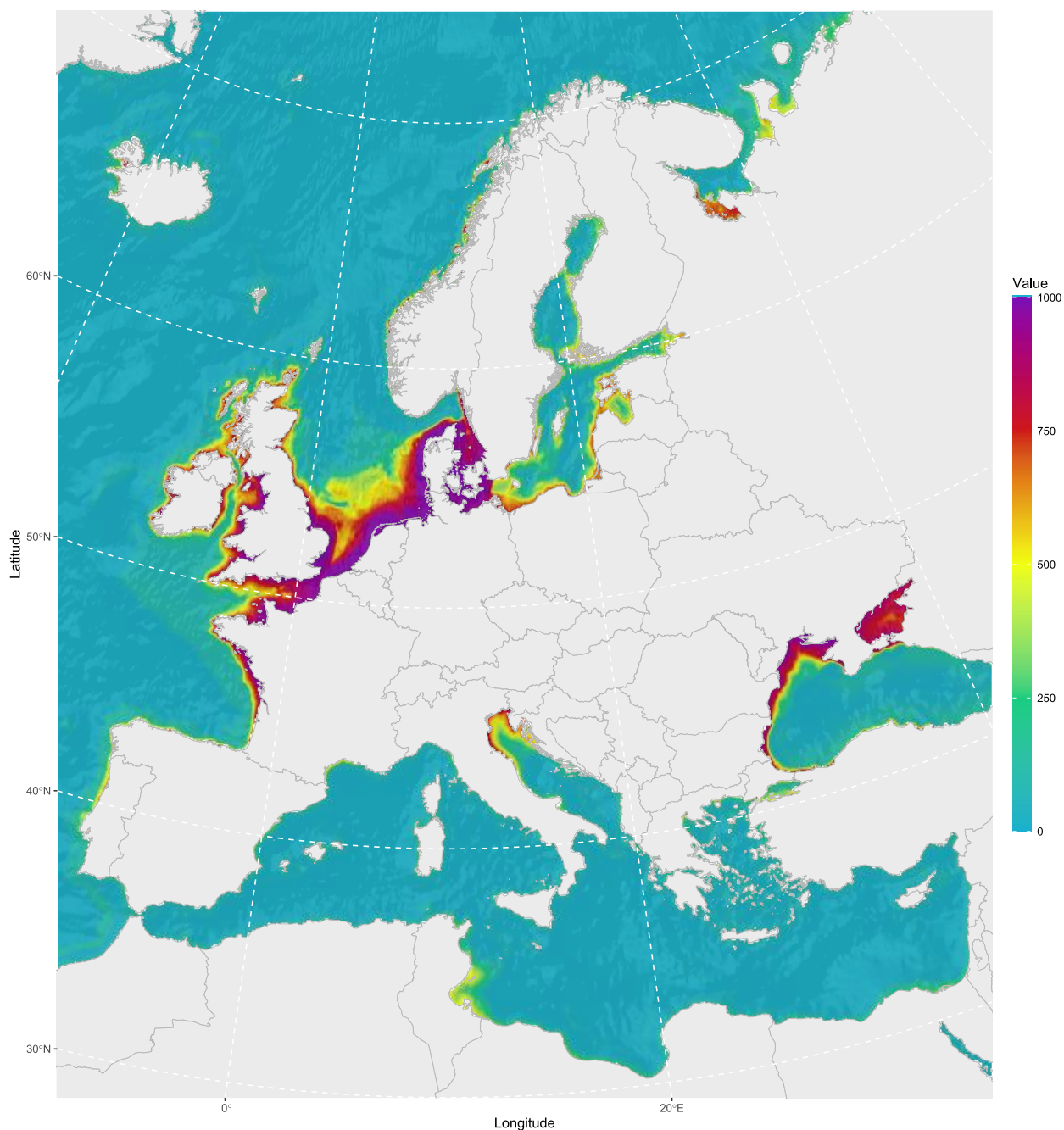
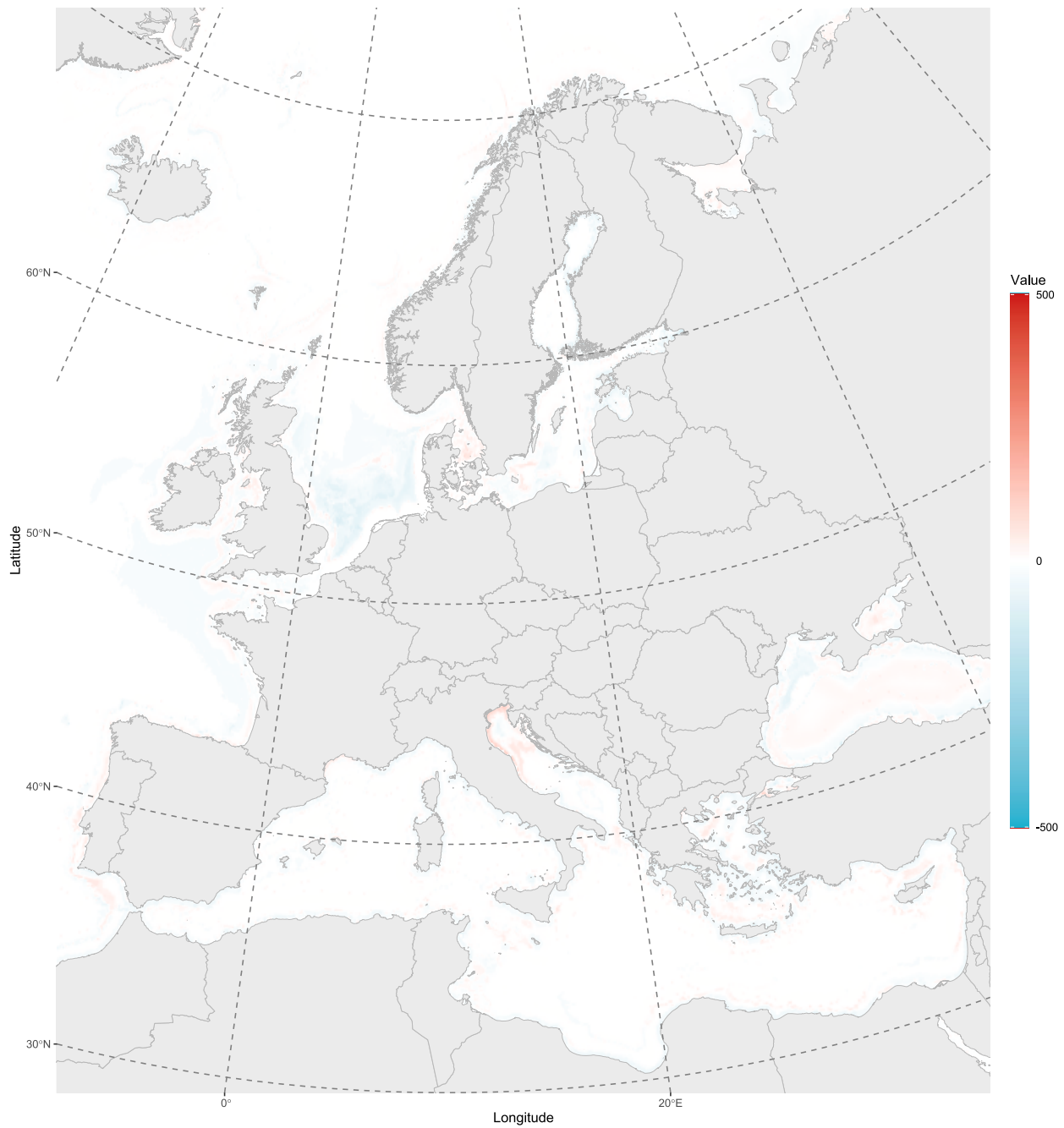
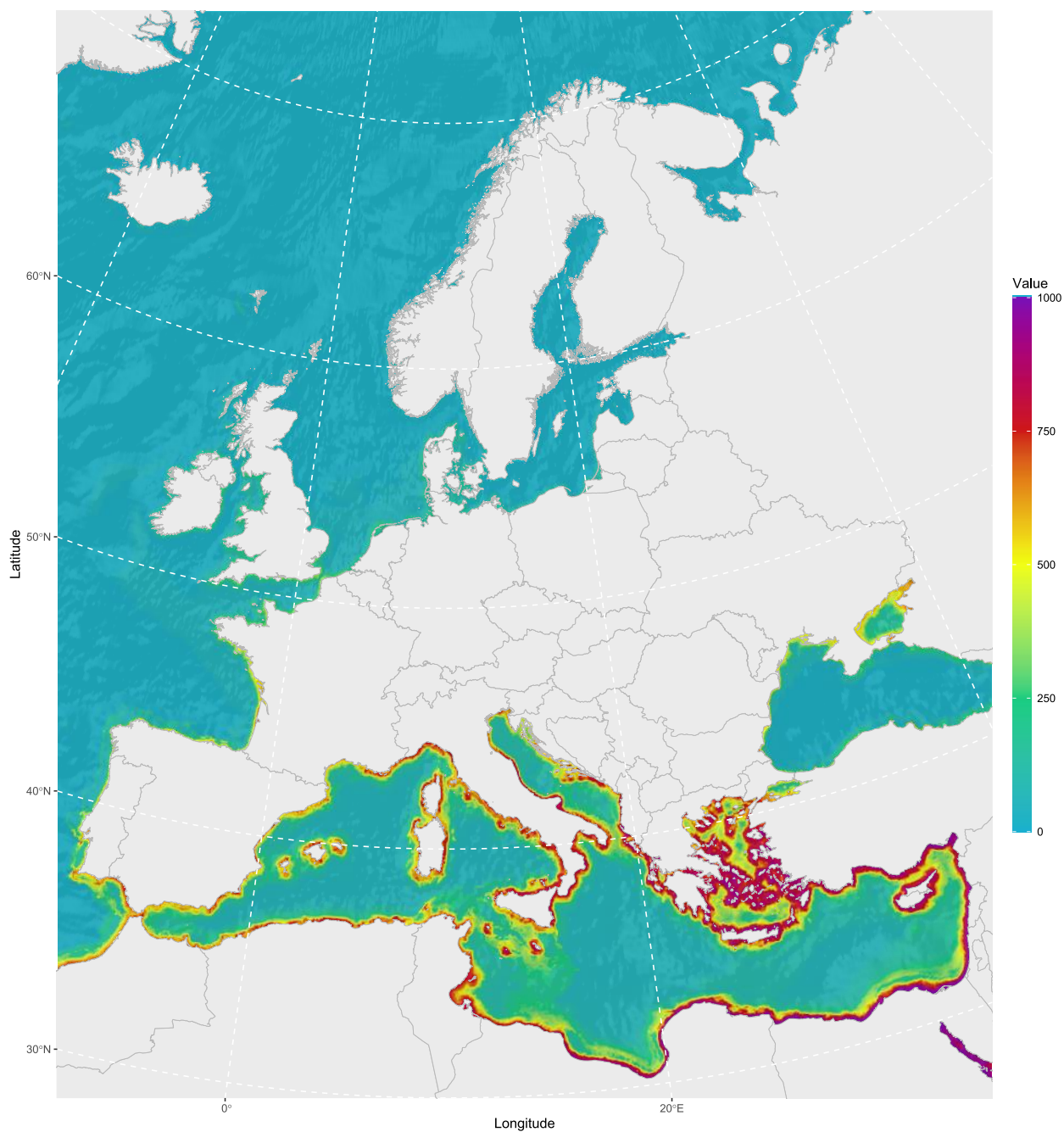


Fig. S23 Predicted habitat suitability of *Hemigrapsus sanguineus* under RCP6.0 in the year 2050.



110 **Fig. S24 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Hemigrapsus sanguineus* under RCP6.0 in the year 2050.**



115 Fig. S25 Predicted habitat suitability of *Matuta victor* under RCP6.0 in the year 2050.

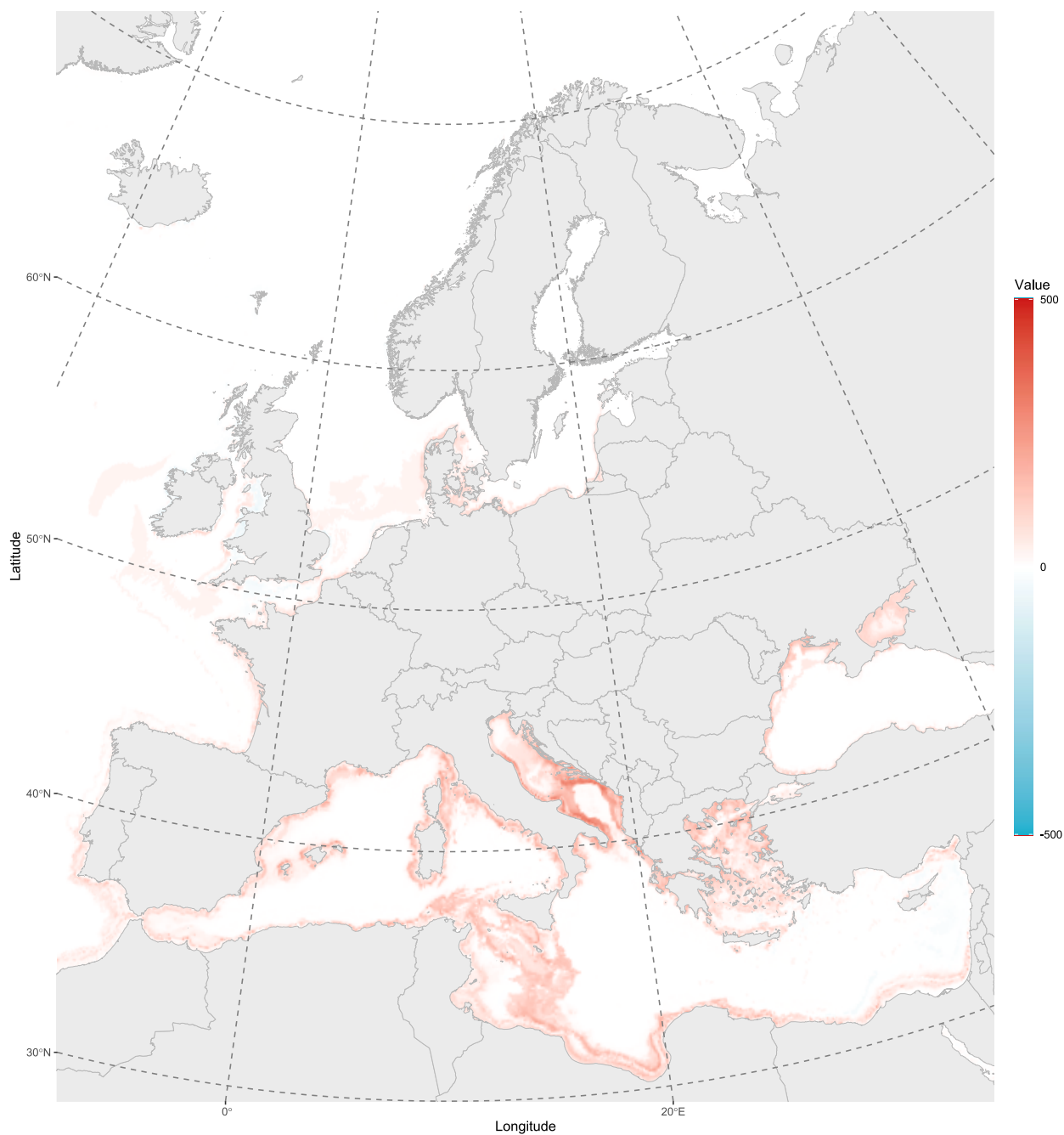


Fig. S26 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Matuta victor* under RCP6.0 in the year 2050.

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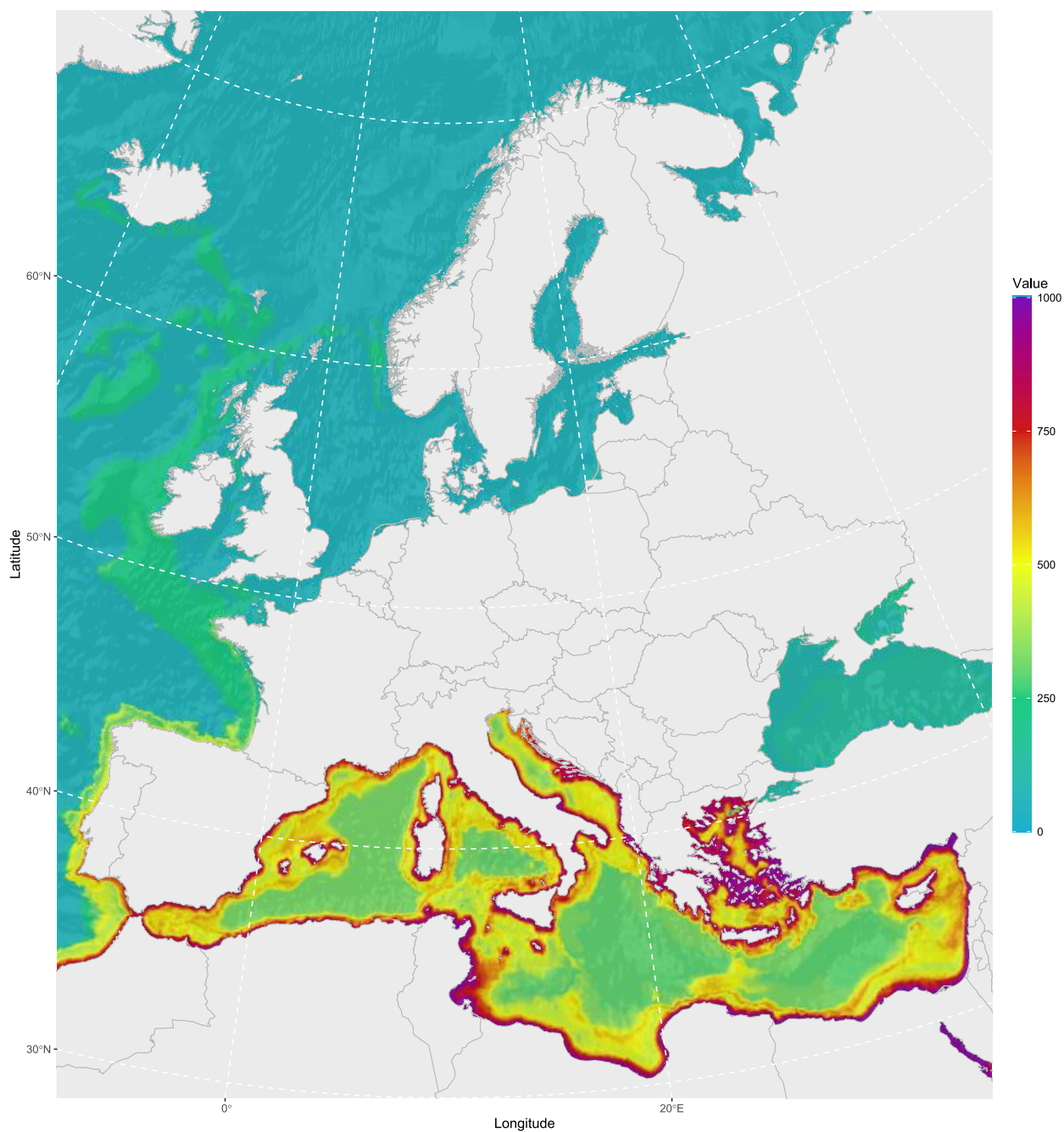


Fig. S27 Predicted habitat suitability of *Portunus signis* under RCP6.0 in the year 2050.

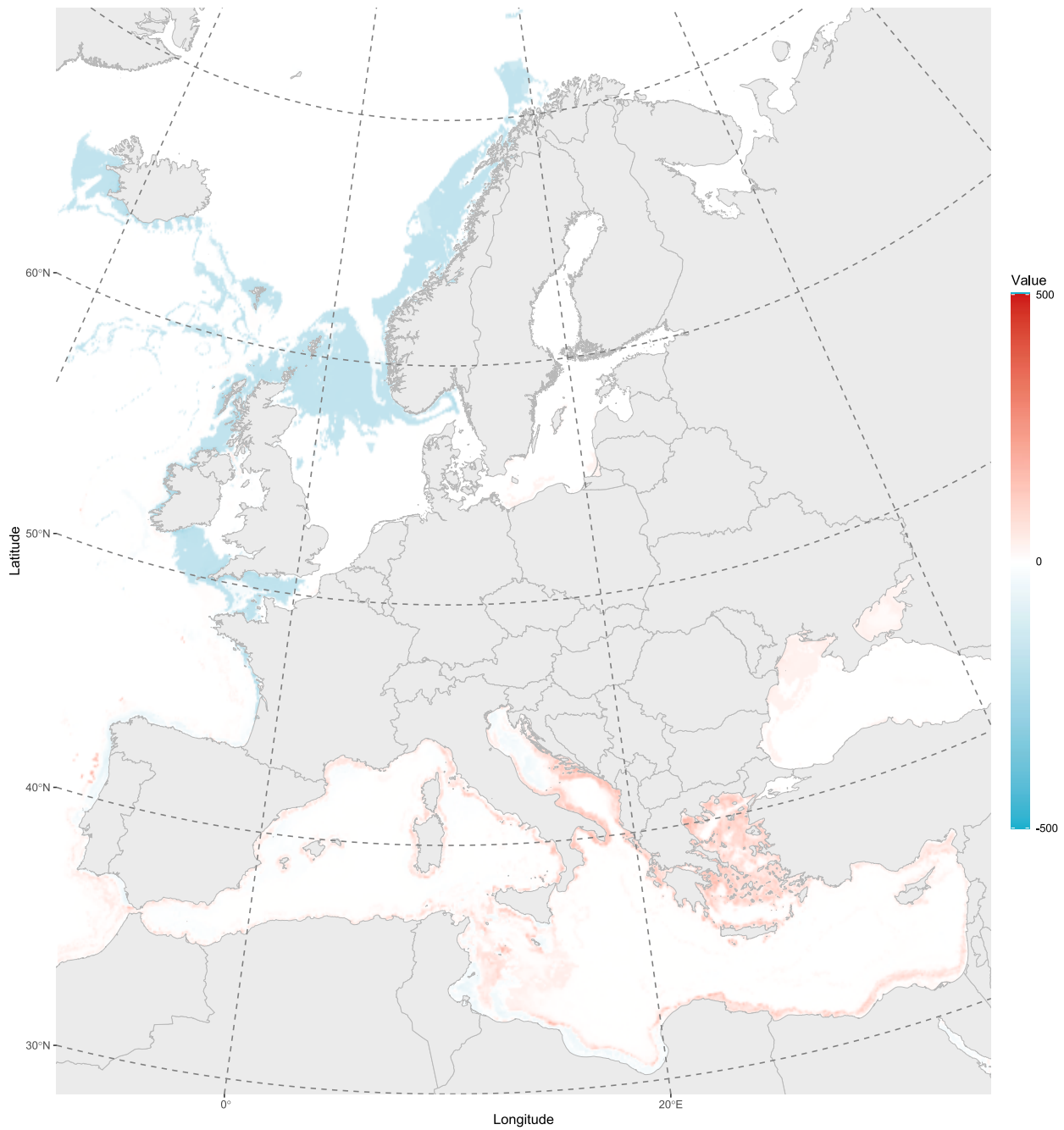
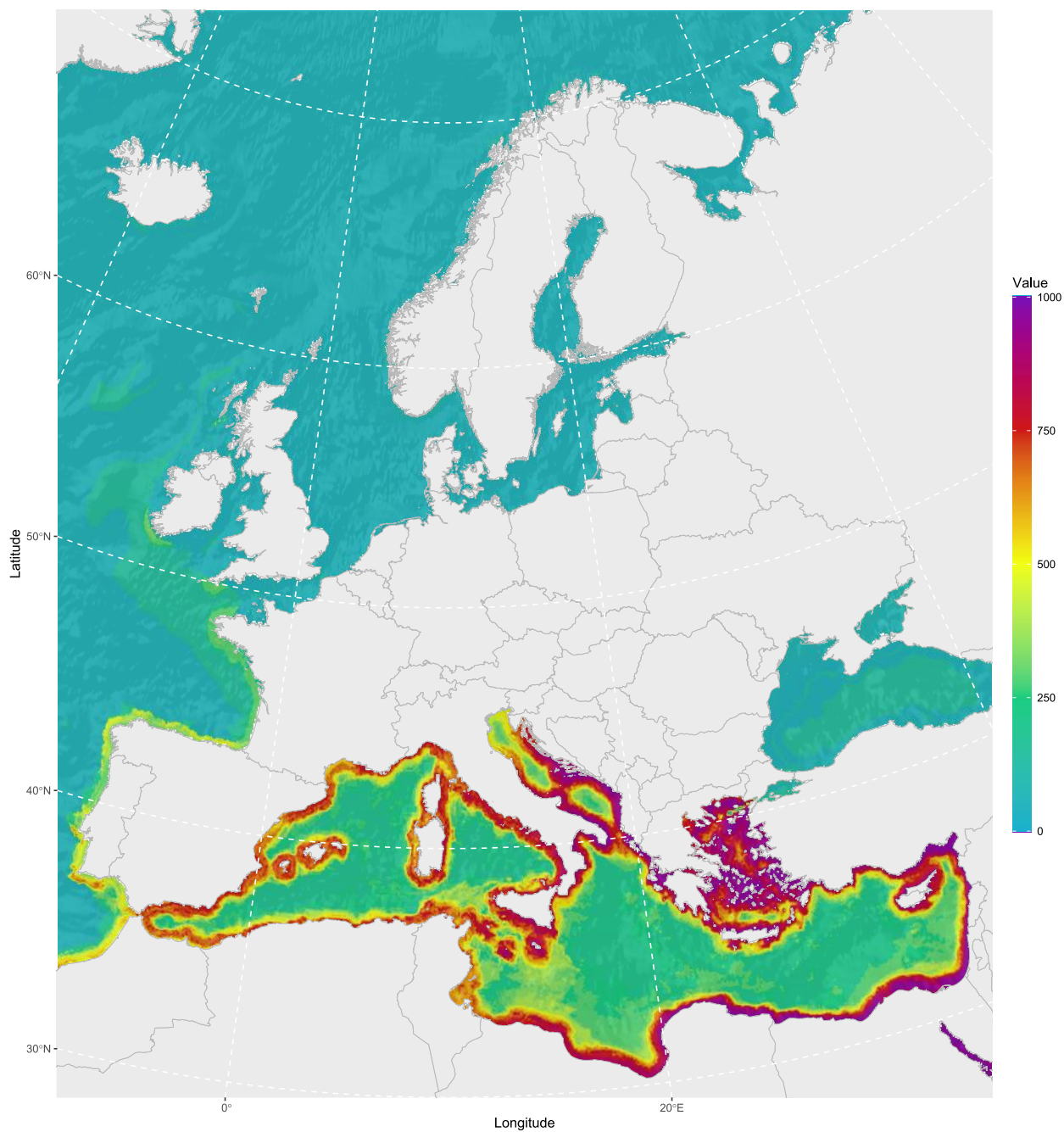
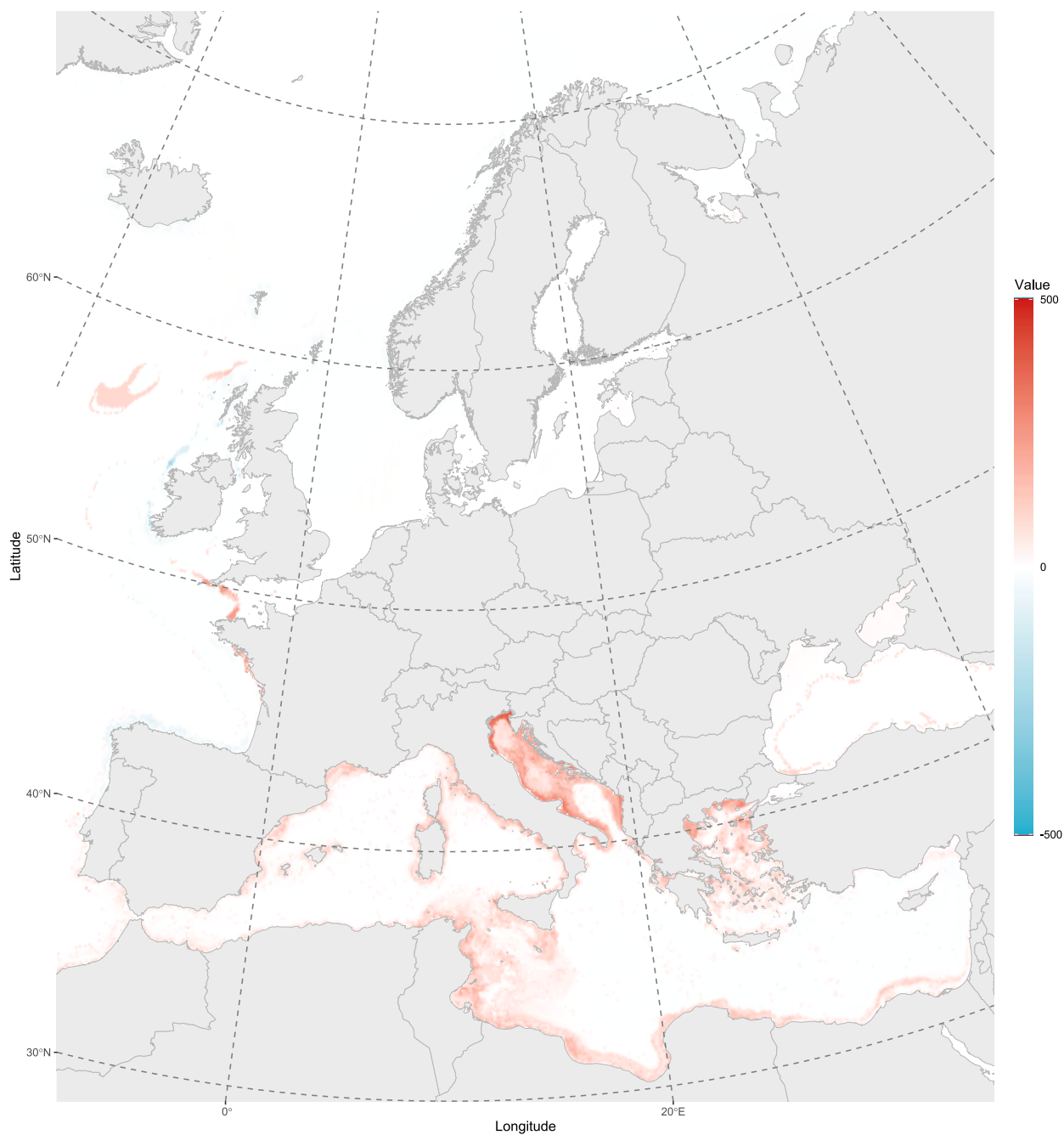


Fig. S28 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Portunus signis* under RCP6.0 in the year 2050.



135 Fig. S29 Predicted habitat suitability of *Charybdis longicollis* under RCP8.5 in the year 2050.



140 **Fig. S30** Difference between current predicted habitat suitability and the future predicted habitat suitability of *Charybdis longicollis* under RCP8.5 in the year 2050.

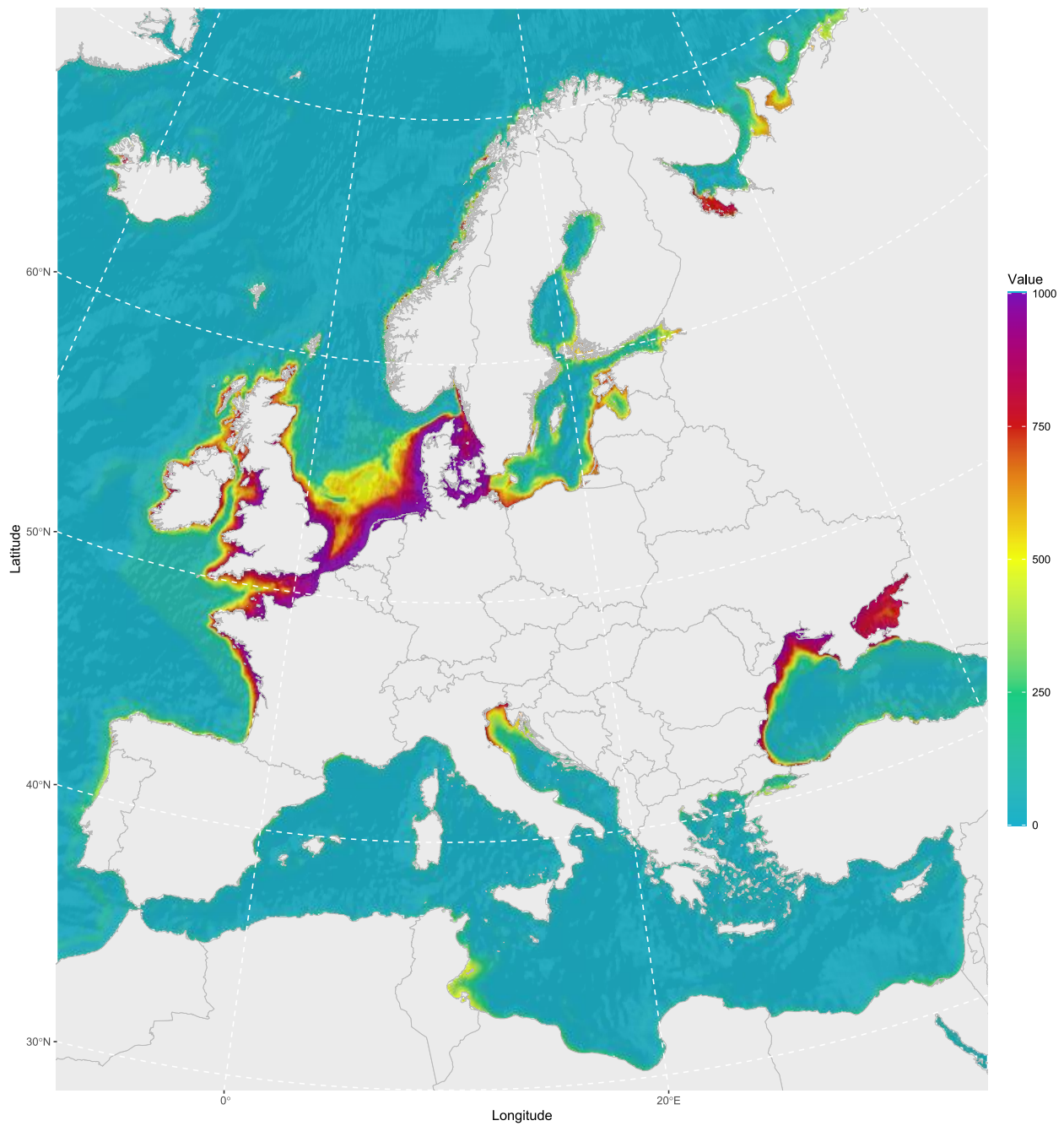


Fig. S31 Predicted habitat suitability of *Hemigrapsus sanguineus* under RCP8.5 in the year 2050.

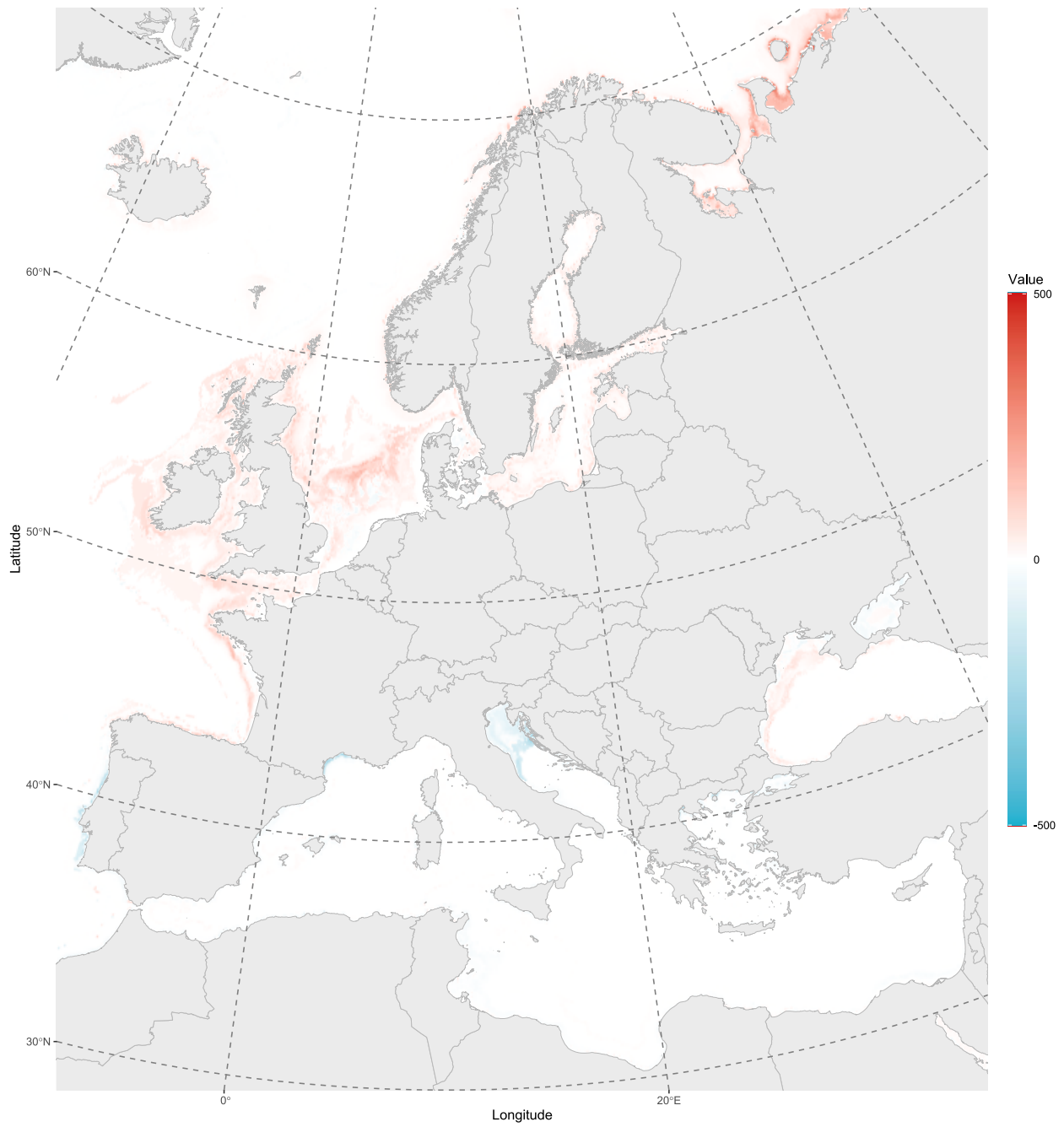
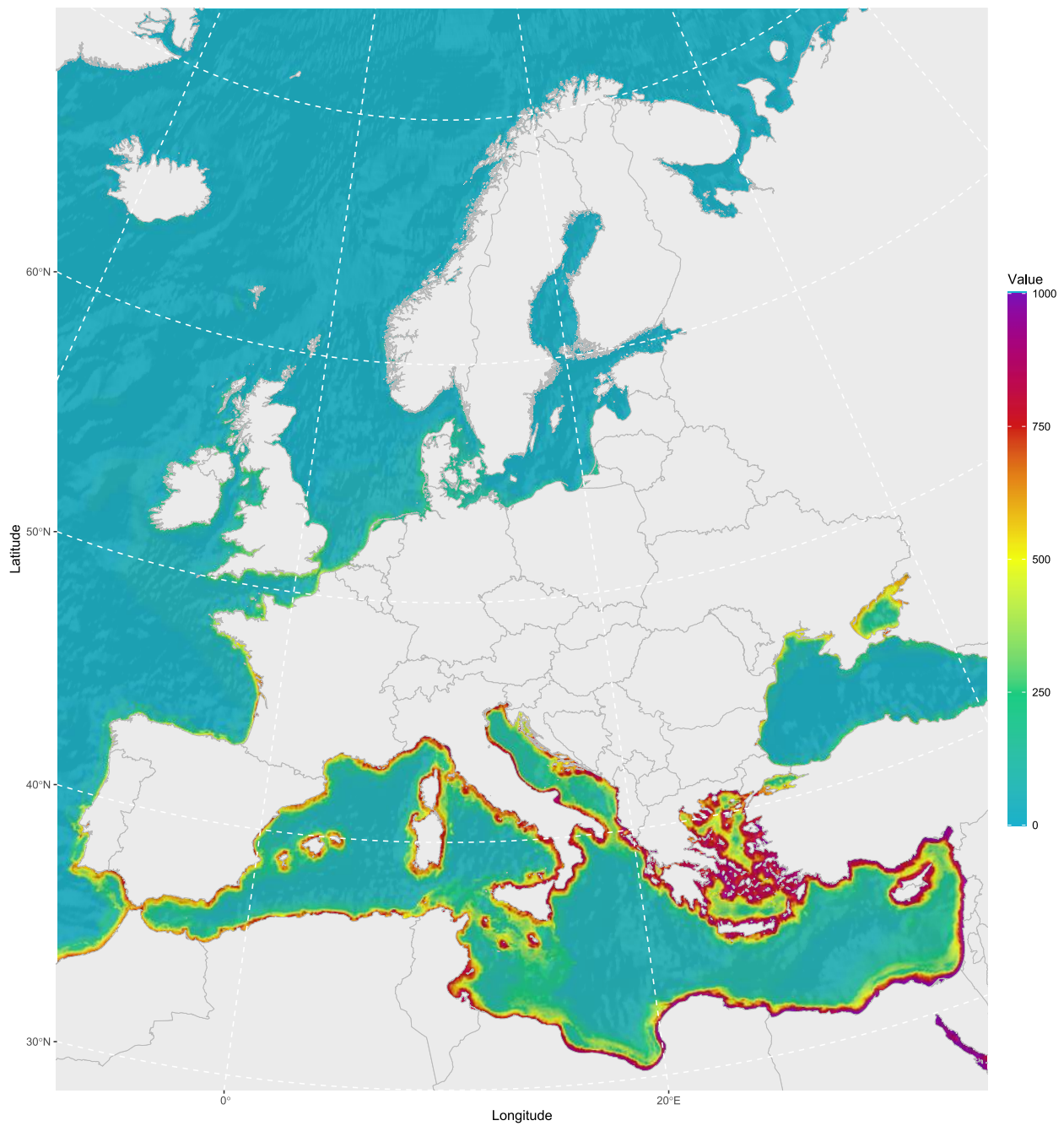
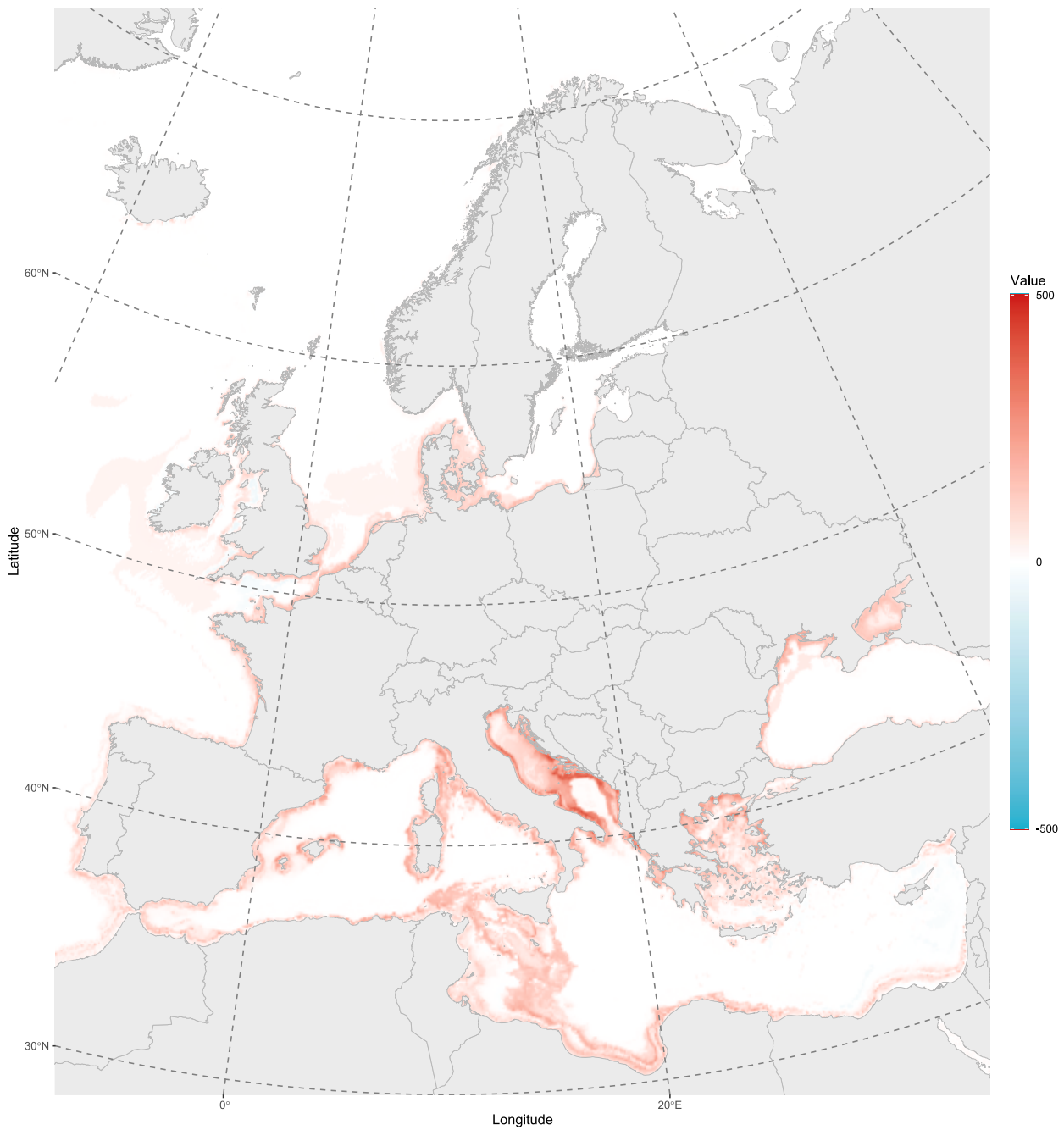


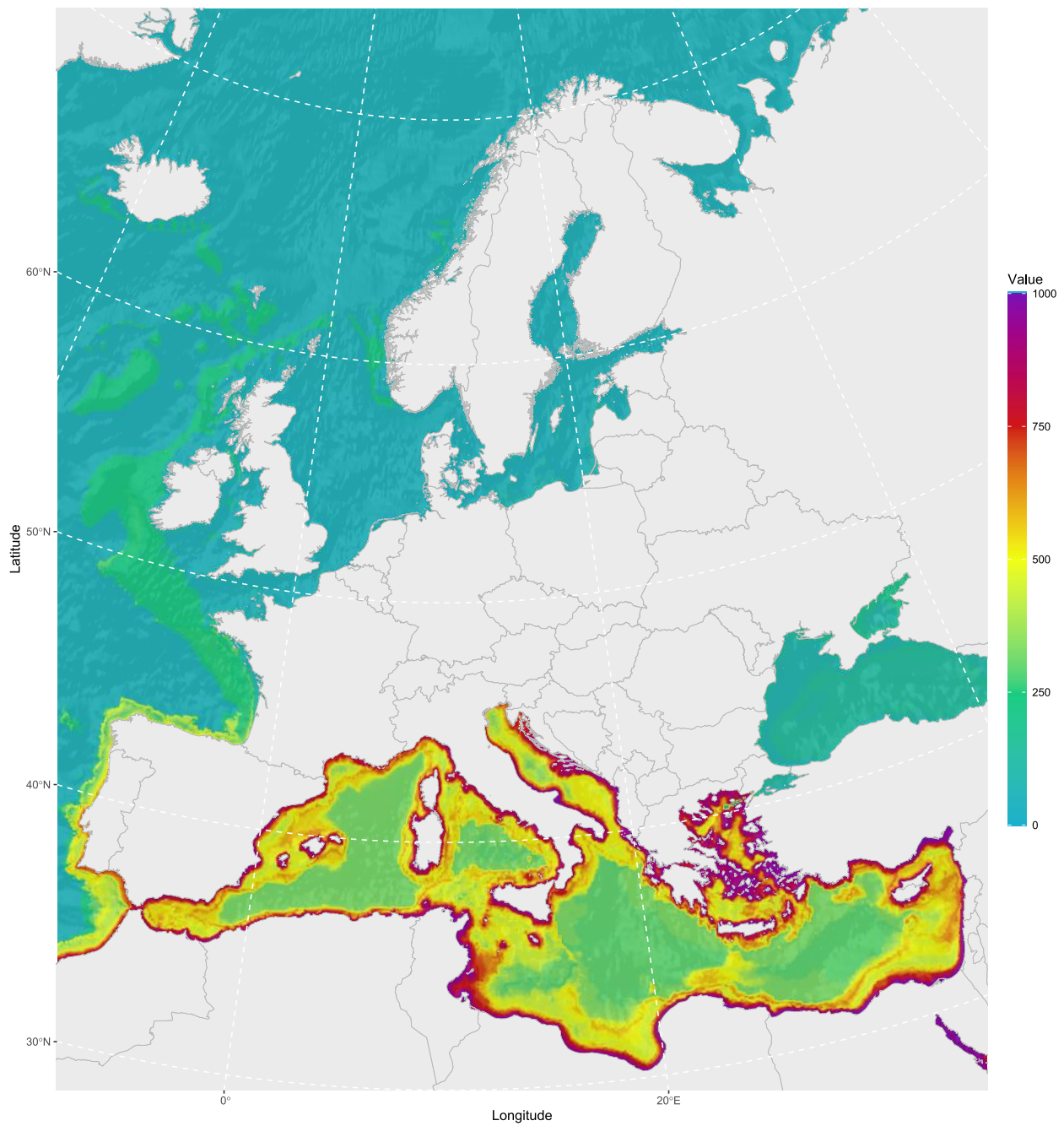
Fig. S32 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Hemigrapsus sanguineus* under RCP8.5 in the year 2050.



150 **Fig. S33 Predicted habitat suitability of *Matuta victor* under RCP8.5 in the year 2050.**



155 **Fig. S34** Difference between current predicted habitat suitability and the future predicted habitat suitability of *Matuta victor* under RCP8.5 in the year 2050.



160 Fig. S35 Predicted habitat suitability of *Portunus signis* under RCP8.5 in the year 2050.

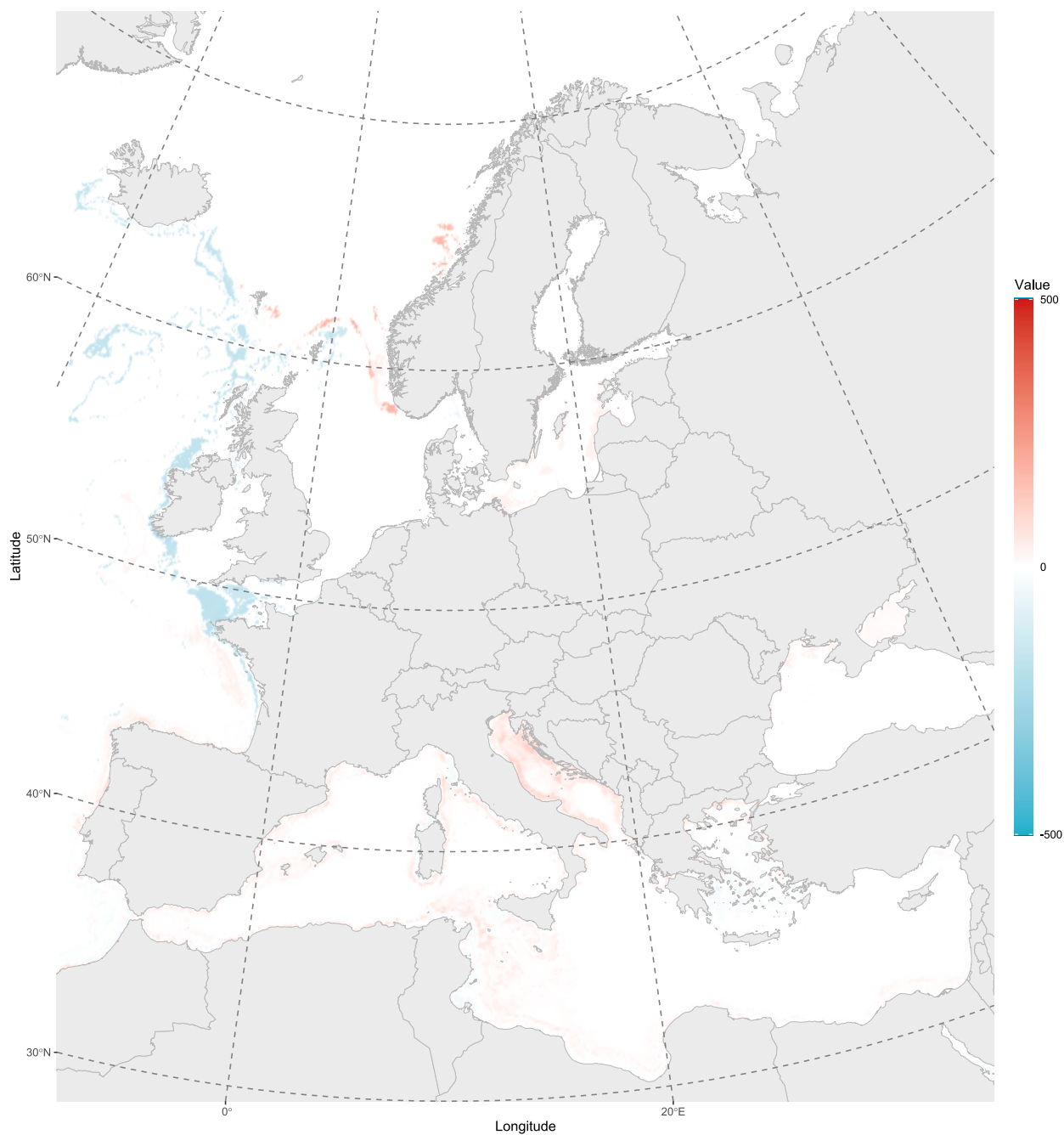


Fig. S36 Difference between current predicted habitat suitability and the future predicted habitat suitability of *Portunus signis* under RCP8.5 in the year 2050.

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S6 Overview of suitable habitat per region

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Table S1. Percent of total area that falls within low (0 – 0.3), medium (0.3 – 0.6) and high (0.6 – 1.0) habitat suitability for European seas. Seas that showed 95% or more in the category low suitability for all scenarios and species were not included in the table. The total size of each sea for which data was available is given in km² behind the name of the respective sea.

| Adriatic sea (139,784) | <i>C. longicollis</i> | | | <i>H. sanguineus</i> | | | <i>M. victor</i> | | | <i>P. segnis</i> | | |
|---|-----------------------|-------|-------|----------------------|-------|-------|------------------|-------|-------|------------------|-------|-------|
| | Low | Med | High | Low | Med | High | Low | Med | High | Low | Med | High |
| Current | 4.3% | 53.7% | 42.0% | 73.0% | 20.3% | 6.7% | 53.8% | 39.0% | 7.2% | 0.3% | 66.6% | 33.1% |
| RCP 4.5 | 5.8% | 38.3% | 55.9% | 73.5% | 21.3% | 5.2% | 34.0% | 46.1% | 19.8% | 0.3% | 56.1% | 43.6% |
| RCP 8.5 | 5.8% | 39.3% | 54.9% | 74.8% | 20.5% | 4.8% | 33.9% | 42.3% | 23.8% | 0.3% | 55.1% | 44.6% |
| Aegean-Levantine Sea (757,833) | | | | | | | | | | | | |
| Current | 0.7% | 58.0% | 41.2% | 97.4% | 2.6% | 0.1% | 45.2% | 28.7% | 26.1% | 0.3% | 65.8% | 33.9% |
| RCP 4.5 | 3.6% | 56.2% | 40.2% | 97.3% | 2.6% | 0.1% | 45.0% | 25.9% | 29.1% | 0.3% | 63.1% | 36.6% |
| RCP 8.5 | 3.6% | 56.1% | 40.3% | 97.6% | 2.4% | 0.0% | 45.0% | 25.8% | 29.3% | 0.3% | 63.0% | 36.7% |
| Baltic Sea (392,215) | | | | | | | | | | | | |
| Current | 3.6% | 56.2% | 40.2% | 97.3% | 2.6% | 0.1% | 45.0% | 25.9% | 29.1% | 0.3% | 63.1% | 36.6% |
| RCP 4.5 | 100.0% | 0.0% | 0.0% | 55.6% | 28.8% | 15.5% | 99.7% | 0.3% | 0.0% | 100.0% | 0.0% | 0.0% |
| RCP 8.5 | 100.0% | 0.0% | 0.0% | 53.3% | 30.5% | 16.2% | 99.0% | 1.0% | 0.0% | 100.0% | 0.0% | 0.0% |
| Bay of Biscay and the Iberian Coast (803,349) | | | | | | | | | | | | |
| Current | 85.8% | 13.9% | 0.3% | 94.2% | 3.6% | 2.3% | 93.5% | 6.1% | 0.4% | 70.9% | 28.0% | 1.1% |
| RCP 4.5 | 85.8% | 13.8% | 0.4% | 94.2% | 3.8% | 2.0% | 92.5% | 6.8% | 0.7% | 70.9% | 28.0% | 1.2% |
| RCP 8.5 | 85.9% | 13.7% | 0.3% | 94.0% | 3.6% | 2.4% | 92.0% | 7.0% | 1.0% | 72.1% | 26.6% | 1.3% |
| Black Sea (462,158) | | | | | | | | | | | | |
| Current | 100.0% | 0.0% | 0.0% | 76.2% | 6.7% | 17.1% | 89.8% | 10.0% | 0.2% | 100.0% | 0.0% | 0.0% |
| RCP 4.5 | 100.0% | 0.0% | 0.0% | 75.6% | 7.1% | 17.3% | 86.2% | 11.9% | 1.9% | 98.6% | 1.4% | 0.0% |
| RCP 8.5 | 100.0% | 0.0% | 0.0% | 75.6% | 7.0% | 17.4% | 86.1% | 12.2% | 1.7% | 98.7% | 1.3% | 0.0% |
| Black Sea - sea of Azov (39,851) | | | | | | | | | | | | |
| Current | 100.0% | 0.0% | 0.0% | 6.8% | 0.0% | 93.2% | 42.0% | 57.2% | 0.8% | 100.0% | 0.0% | 0.0% |
| RCP 4.5 | 100.0% | 0.0% | 0.0% | 6.8% | 0.0% | 93.2% | 21.3% | 64.2% | 14.4% | 85.1% | 14.9% | 0.0% |
| RCP 8.5 | 100.0% | 0.0% | 0.0% | 6.8% | 0.0% | 93.2% | 21.2% | 67.4% | 11.4% | 86.4% | 13.6% | 0.0% |
| Celtic Seas (974,385) | | | | | | | | | | | | |
| Current | 97.8% | 2.2% | 0.0% | 84.8% | 7.8% | 7.4% | 97.5% | 2.5% | 0.0% | 43.7% | 56.3% | 0.0% |
| RCP 4.5 | 98.0% | 2.0% | 0.0% | 84.7% | 8.0% | 7.3% | 96.6% | 3.4% | 0.0% | 56.6% | 43.4% | 0.0% |
| RCP 8.5 | 97.9% | 2.1% | 0.0% | 83.6% | 8.4% | 8.0% | 96.1% | 3.9% | 0.0% | 68.0% | 32.0% | 0.0% |
| Greater North Sea, incl. the Kattegat and the English Channel (654,179) | | | | | | | | | | | | |
| Current | 99.9% | 0.1% | 0.0% | 50.4% | 16.1% | 33.5% | 97.9% | 2.1% | 0.0% | 66.2% | 33.8% | 0.0% |
| RCP 4.5 | 99.9% | 0.1% | 0.0% | 50.3% | 17.8% | 31.9% | 95.8% | 4.2% | 0.0% | 91.7% | 8.3% | 0.0% |
| RCP 8.5 | 99.9% | 0.1% | 0.0% | 48.9% | 16.1% | 35.0% | 93.4% | 6.6% | 0.0% | 96.7% | 3.3% | 0.0% |
| Ionian Sea and the Central Mediterranean Sea (773,032) | | | | | | | | | | | | |
| Current | 1.9% | 78.4% | 19.7% | 94.9% | 5.1% | 0.0% | 71.6% | 19.6% | 8.8% | 0.1% | 81.9% | 18.0% |
| RCP 4.5 | 3.5% | 74.6% | 21.9% | 94.8% | 5.2% | 0.0% | 62.6% | 26.3% | 11.1% | 0.1% | 80.6% | 19.3% |

| | | | | | | | | | | | | |
|--|--------|-------|-------|-------|-------|-------|--------|-------|-------|--------|-------|-------|
| RCP 8.5 | 3.1% | 74.2% | 22.7% | 95.1% | 4.9% | 0.0% | 62.5% | 26.3% | 11.2% | 0.1% | 80.2% | 19.8% |
| Mediterranean Sea (2,516,651) | | | | | | | | | | | | |
| Current | 8.7% | 62.5% | 28.7% | 95.4% | 4.2% | 0.4% | 61.3% | 25.9% | 12.8% | 0.2% | 75.2% | 24.7% |
| RCP 4.5 | 10.5% | 58.4% | 31.1% | 95.4% | 4.3% | 0.3% | 55.7% | 27.7% | 16.6% | 0.2% | 73.0% | 26.8% |
| RCP 8.5 | 10.4% | 58.3% | 31.3% | 95.7% | 4.0% | 0.3% | 55.4% | 27.2% | 17.4% | 0.2% | 72.5% | 27.3% |
| Western Mediterranean Sea (846,003) | | | | | | | | | | | | |
| Current | 22.8% | 53.5% | 23.7% | 97.8% | 2.2% | 0.0% | 67.4% | 27.1% | 5.5% | 0.1% | 78.8% | 21.1% |
| RCP 4.5 | 23.8% | 49.0% | 27.2% | 97.8% | 2.2% | 0.0% | 62.4% | 27.6% | 10.0% | 0.1% | 77.7% | 22.2% |
| RCP 8.5 | 23.7% | 49.0% | 27.3% | 98.1% | 1.9% | 0.0% | 61.9% | 26.8% | 11.3% | 0.1% | 77.0% | 22.9% |
| White Sea (89,442) | | | | | | | | | | | | |
| Current | 100.0% | 0.0% | 0.0% | 69.6% | 17.5% | 12.9% | 100.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% |
| RCP 4.5 | 100.0% | 0.0% | 0.0% | 64.5% | 18.3% | 17.1% | 100.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% |
| RCP 8.5 | 100.0% | 0.0% | 0.0% | 62.9% | 19.8% | 17.3% | 100.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% |