A

Maps of effort and sightings

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Appendix A: Maps of effort and sightings

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1. Maps of effort and sightings for the Marmara Sea

1.1. Bottlenose dolphin

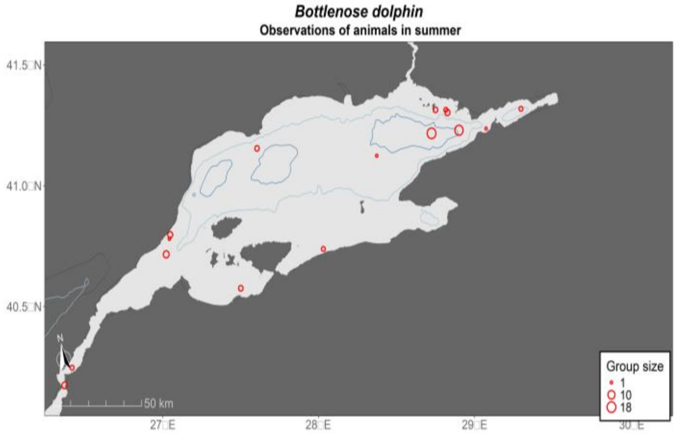

Figure A-1. Map of sightings of bottlenose dolphin in summer.

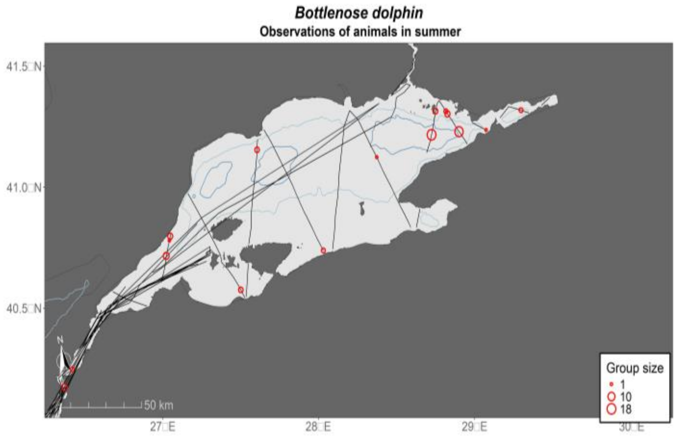

Figure A-2. Map of effort and sightings of bottlenose dolphin in summer.

1.2. Common dolphin

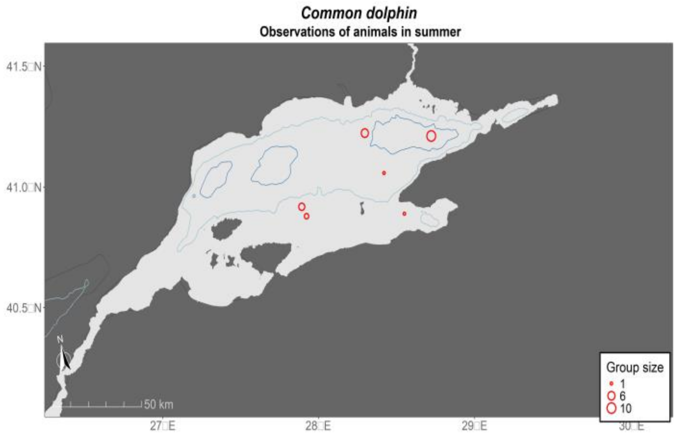

Figure A-3. Map of sightings of common dolphin in summer.

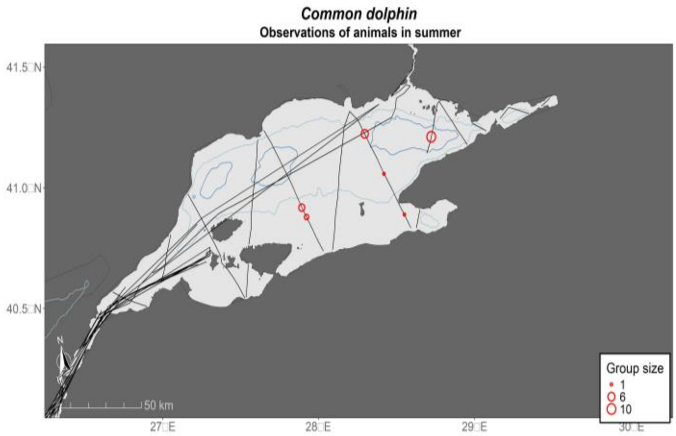

Figure A-4. Map of effort and sightings of common dolphin in summer.

1.3. Harbor porpoise

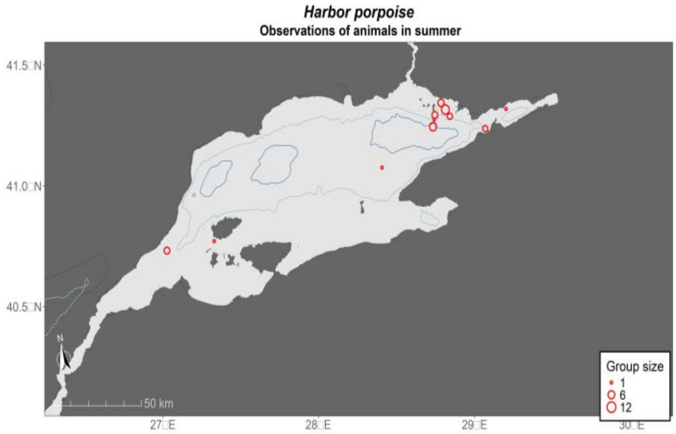

Figure A-5. Map of sightings of harbor porpoise in summer.

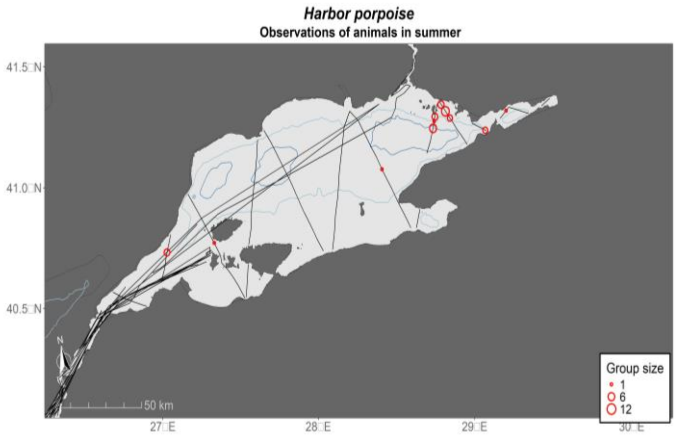

Figure A-6. Map of effort and sightings of harbor porpoise in summer.

2. Maps of effort and sightings for the Azov Sea

2.1. Bottlenose dolphin

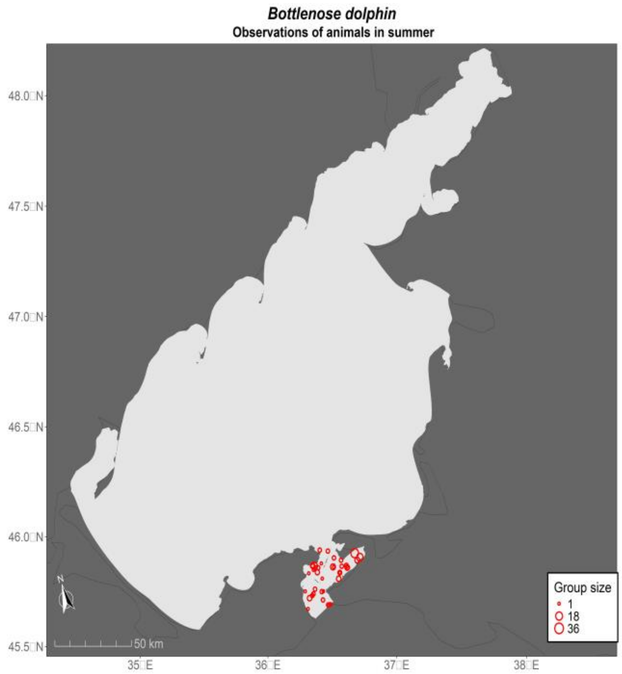

Figure A-7. Map of sightings of bottlenose dolphin in summer.

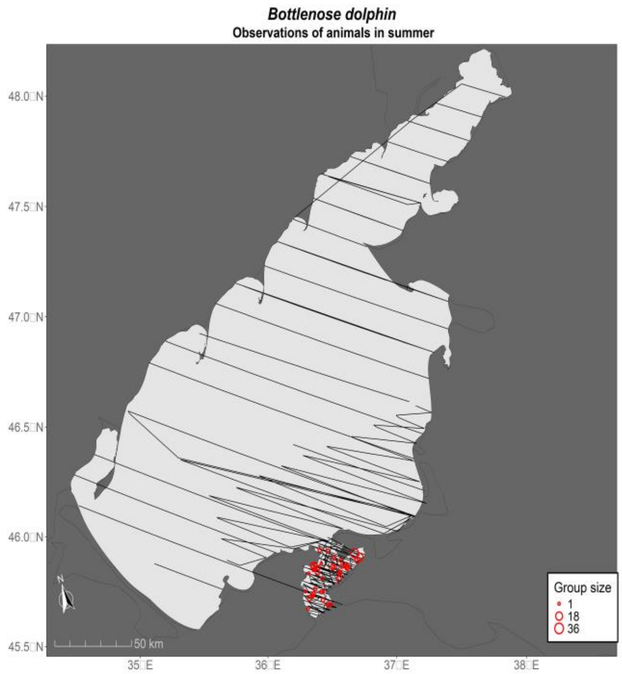

Figure A-8. Map of effort and sightings of bottlenose dolphin in summer.

2.2. Harbor porpoise

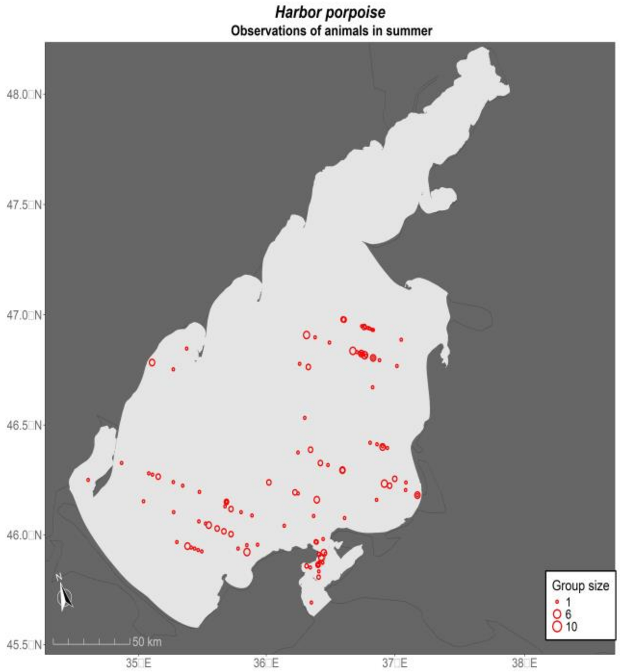

Figure A-9. Map of sightings of harbor porpoise in summer.

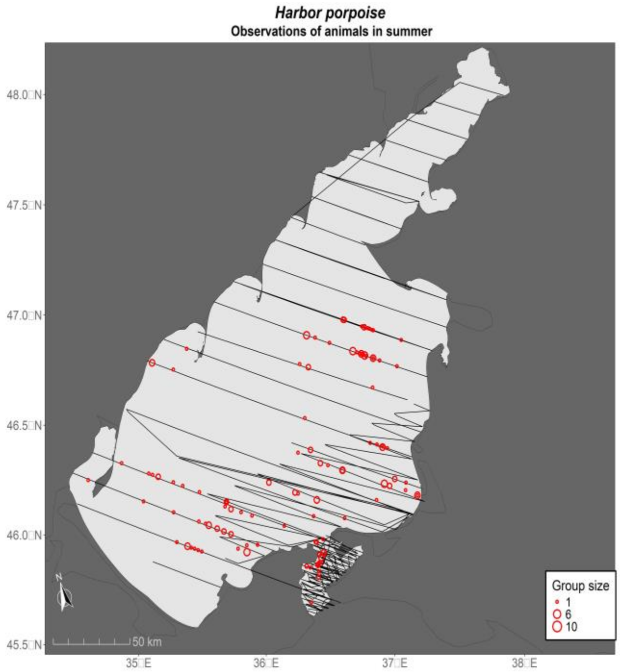

Figure A-10. Map of effort and sightings of harbor porpoise in summer.

3. Maps of effort and sightings for the Black Sea

3.1. Bottlenose dolphin

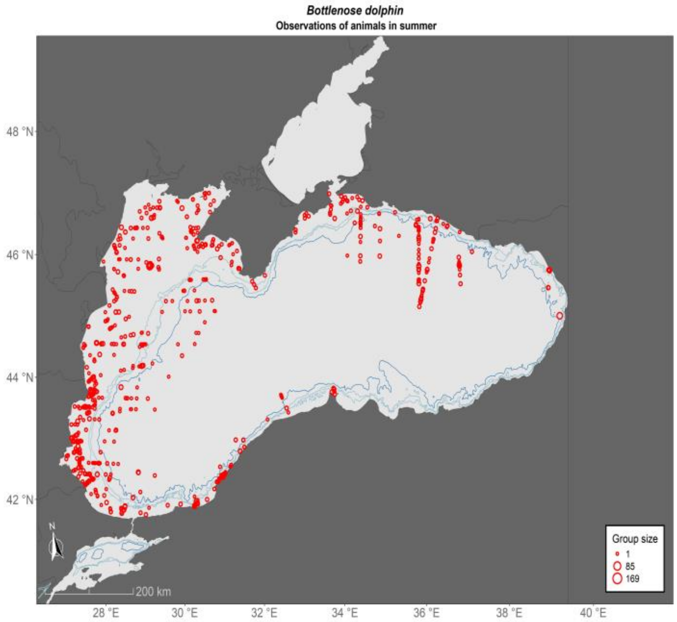

Figure A-11. Map of sightings of bottlenose dolphin in summer.

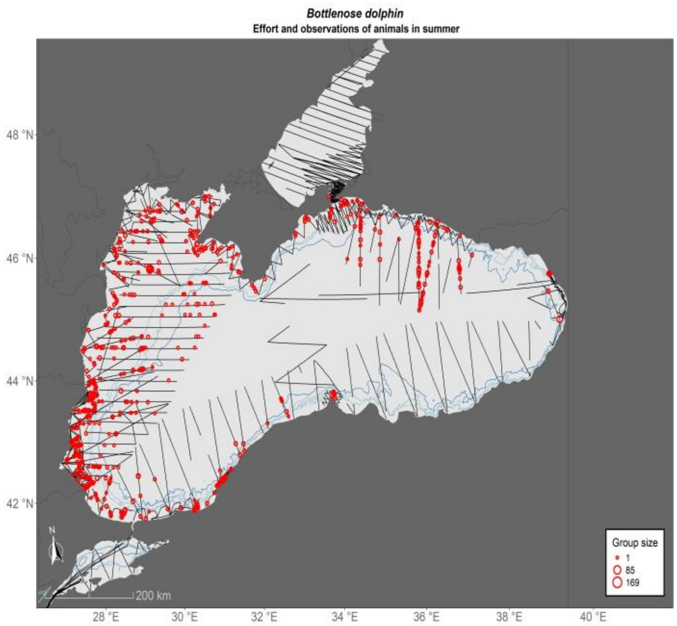

Figure A-12. Map of effort and sightings of bottlenose dolphin in summer.

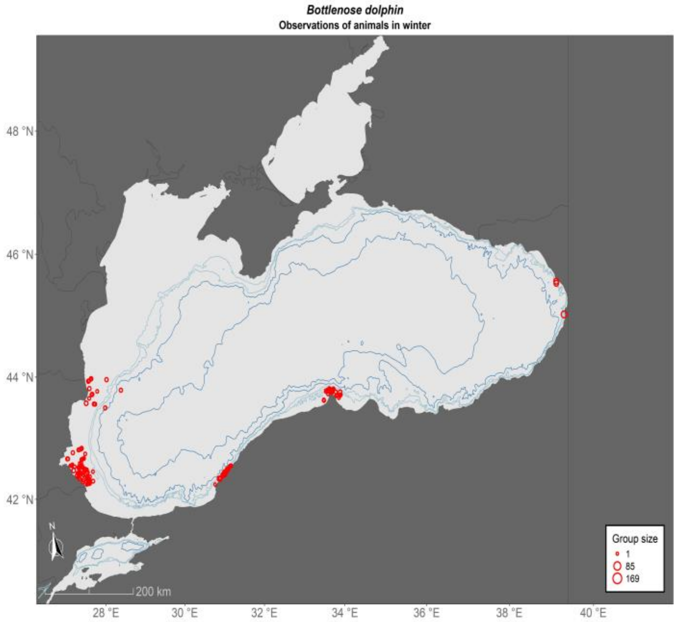

Figure A-13. Map of sightings of bottlenose dolphin in winter.

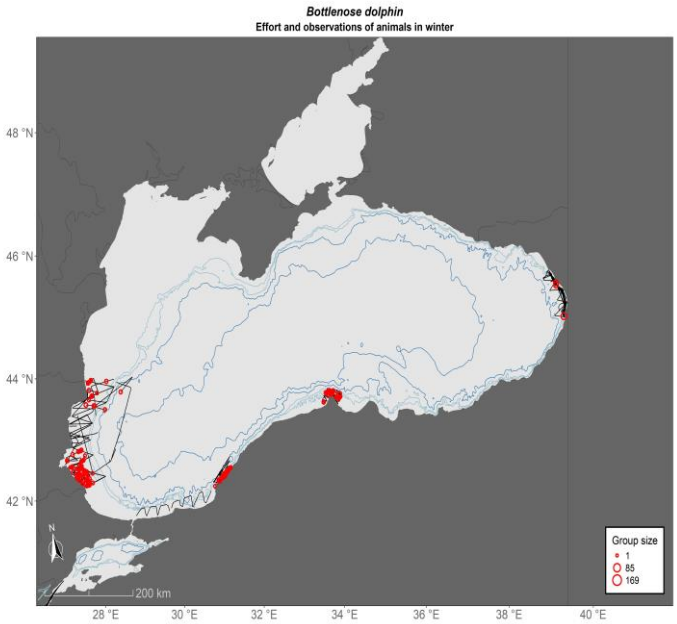

Figure A-14. Map of effort and sightings of bottlenose dolphin in winter.

3.2. Common dolphin

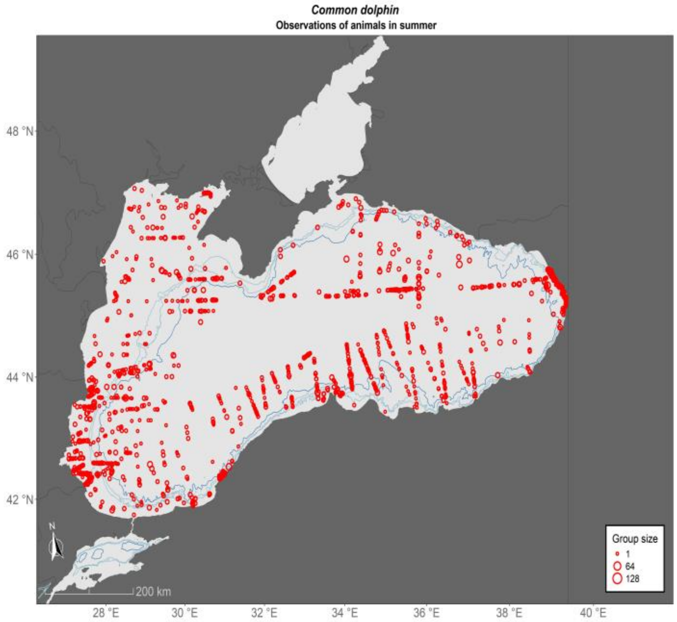

Figure A-15. Map of sightings of common dolphin in summer.

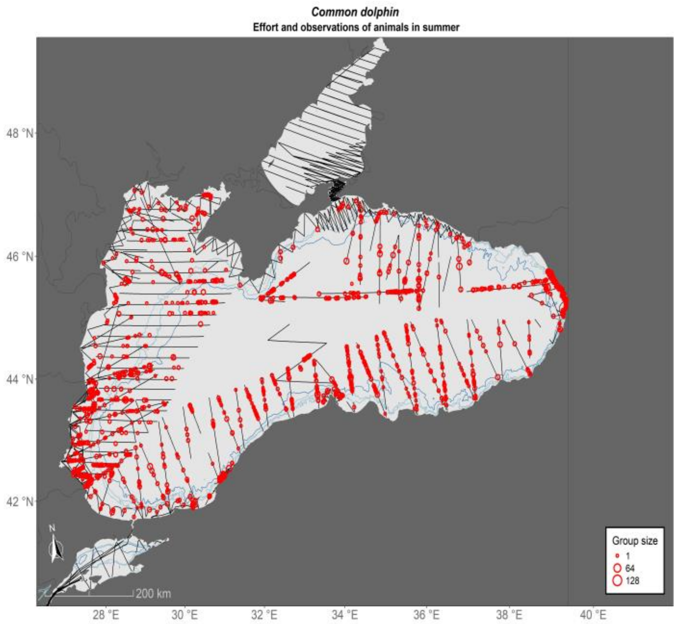

Figure A-16. Map of effort and sightings of common dolphin in summer.

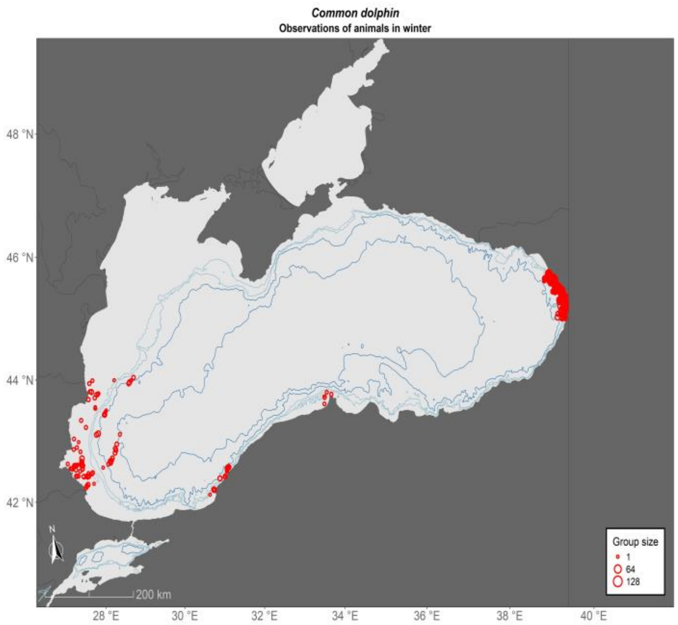

Figure A-17. Map of sightings of common dolphin in winter.

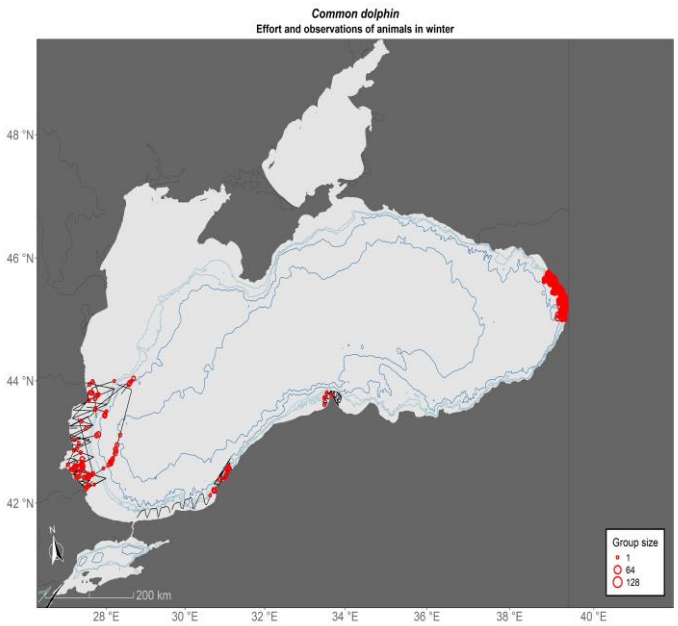

Figure A-18. Map of effort and sightings of common dolphin in winter.

3.3. Harbor porpoise

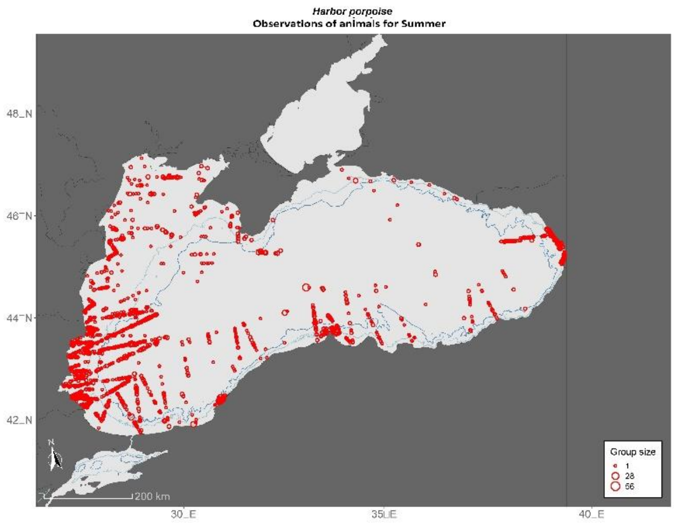

Figure A-19. Map of sightings of harbor porpoise in summer.

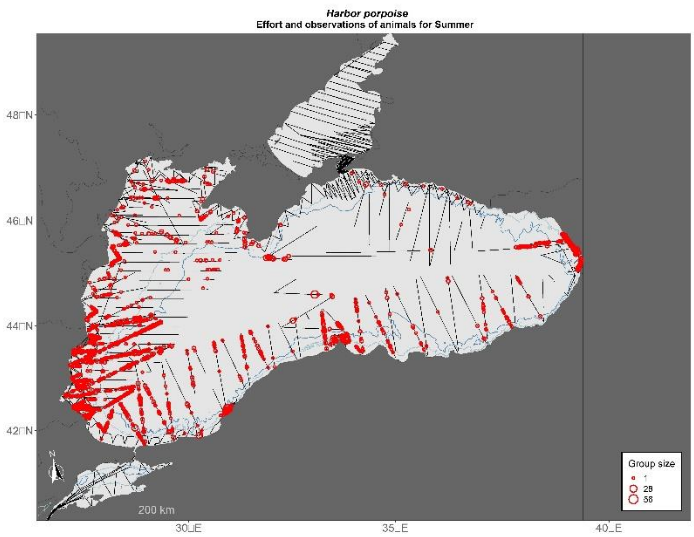

Figure A-20. Map of effort and sightings of harbor porpoise in summer.

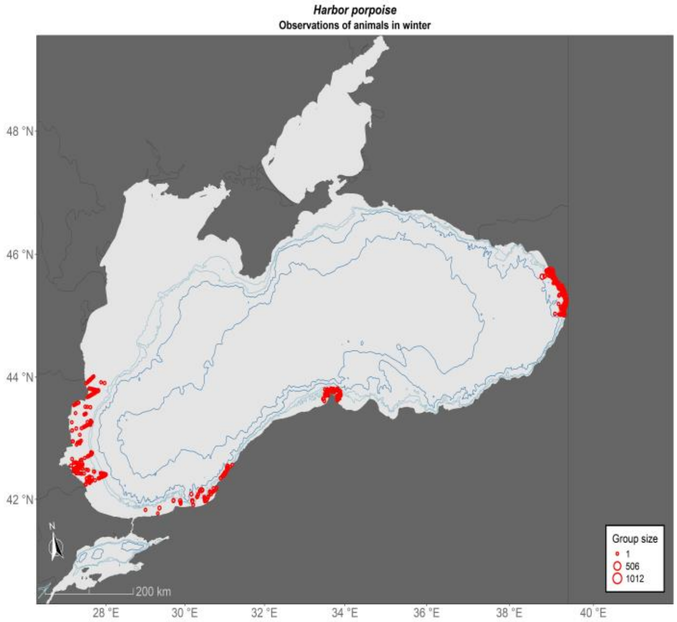

Figure A-21. Map of sightings of harbor porpoise in winter.

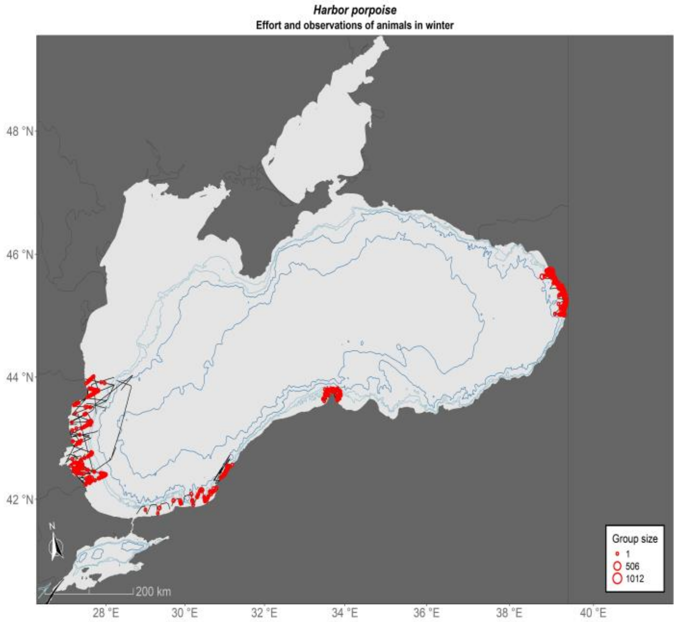

Figure A-22. Map of effort and sightings of harbor porpoise in winter.

4. Maps of effort and sightings for the Mediterranean Sea

4.1. Fin whale

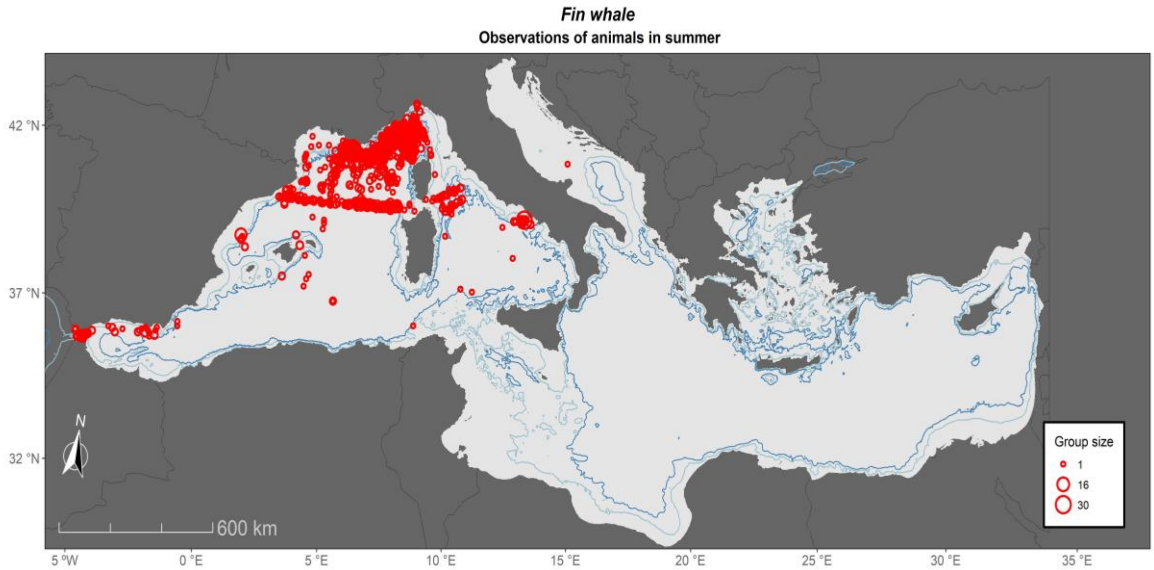

Figure A-23. Map of sightings of fin whale in summer.

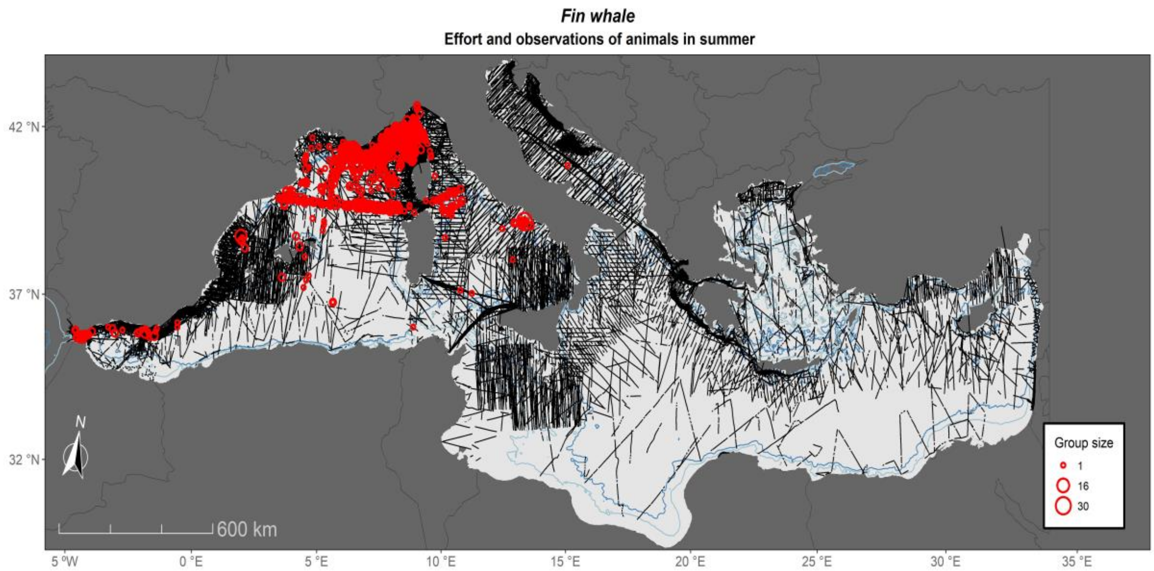

Figure A-24. Map of effort and sightings of fin whale in summer.

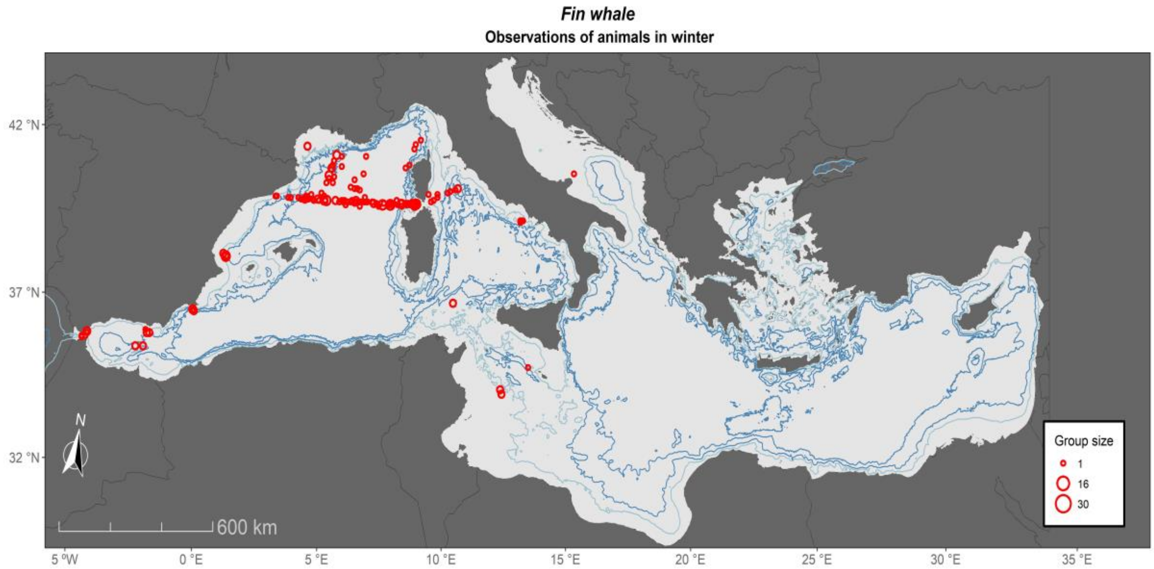

Figure A-25. Map of sightings of fin whale in winter.

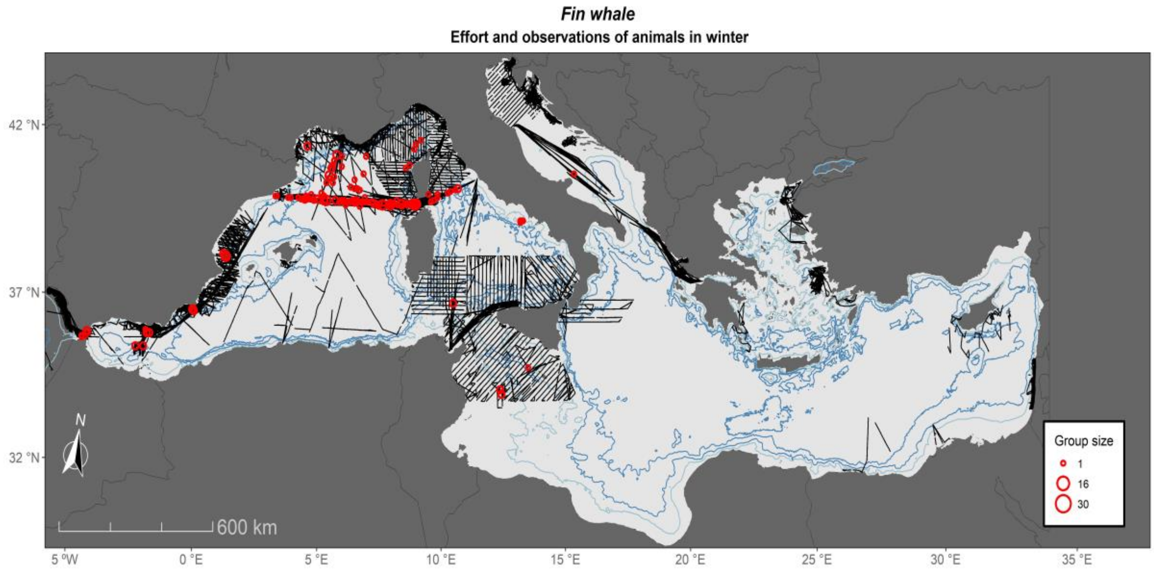

Figure A-26. Map of effort and sightings of fin whale in winter.

4.2. Sperm whale

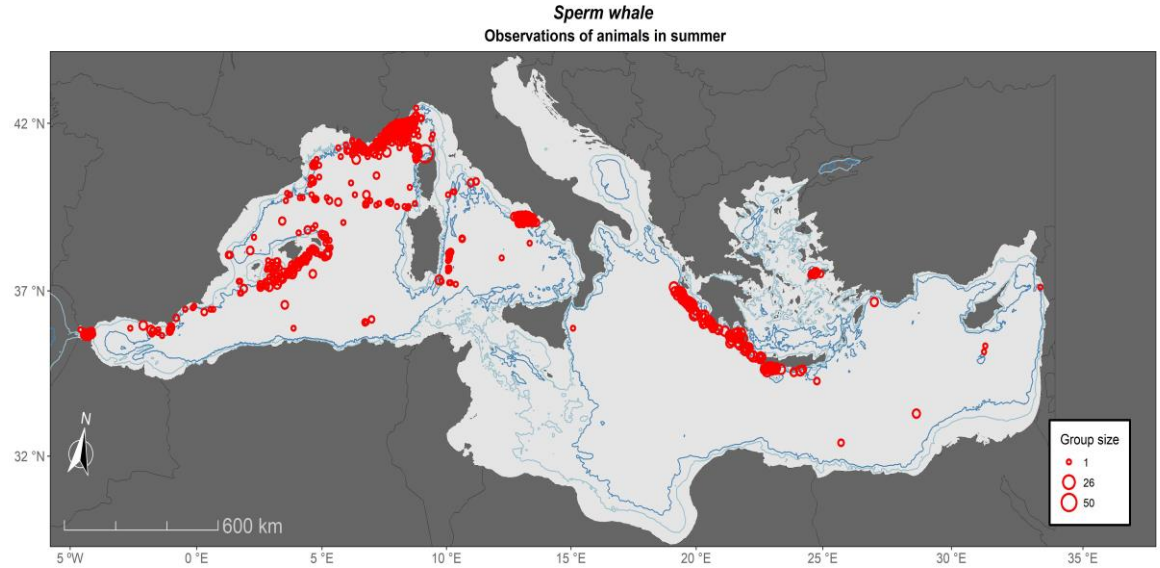

Figure A-27. Map of sightings of sperm whale in summer.

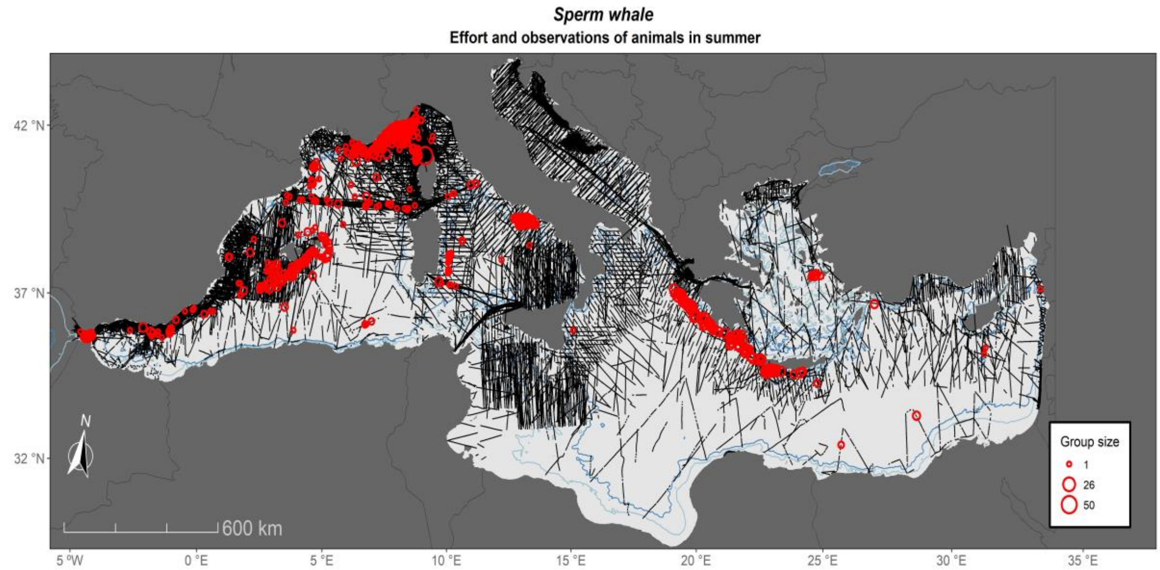

Figure A-28. Map of effort and sightings of sperm whale in summer.

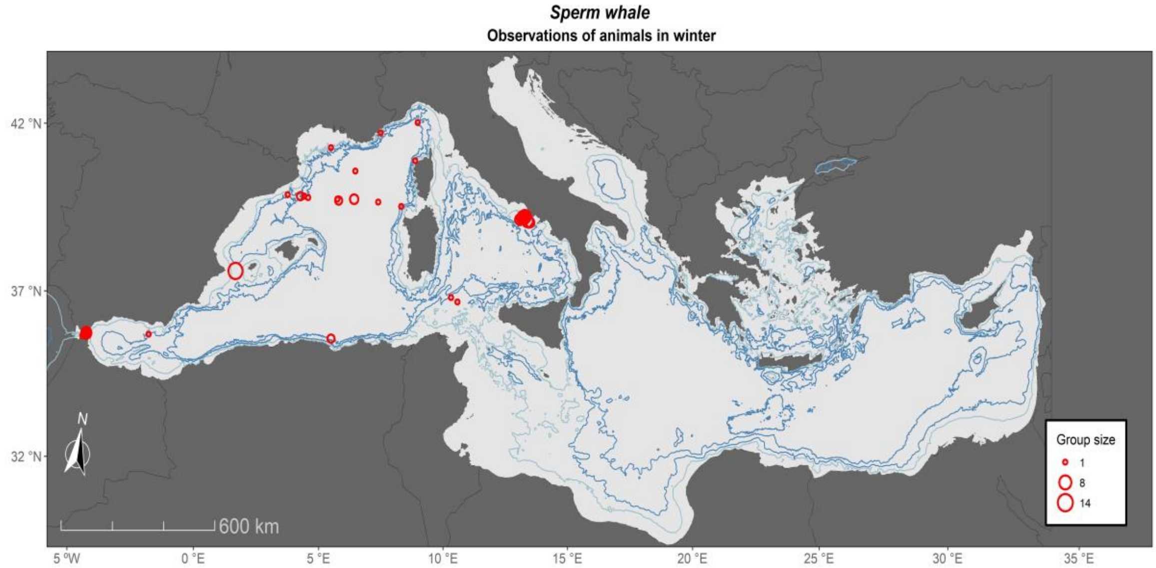

Figure A-29. Map of sightings of sperm whale in winter.

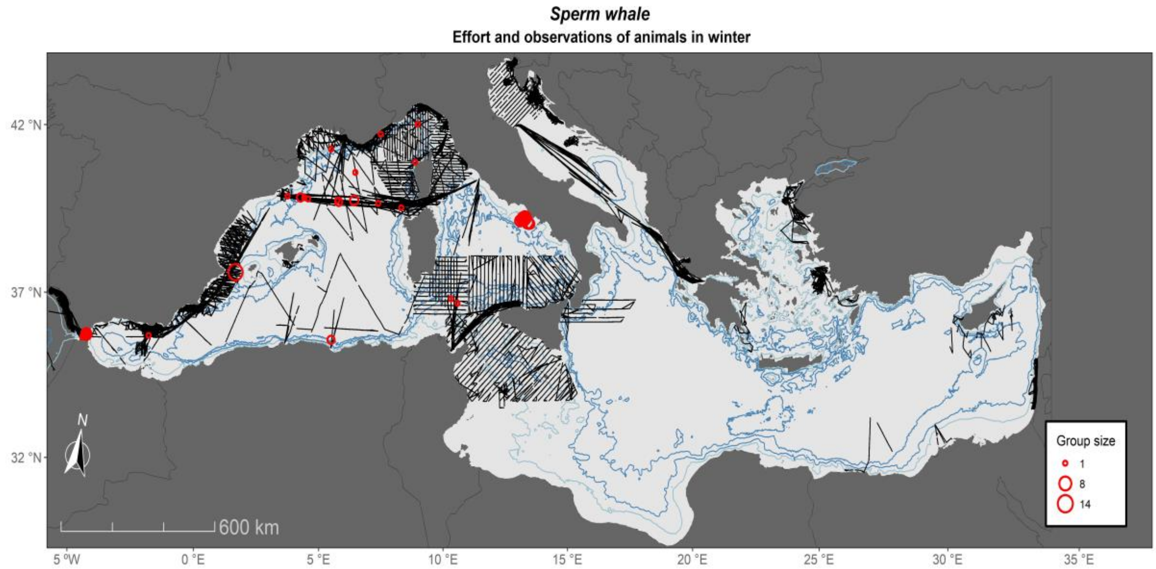

Figure A-30. Map of effort and sightings of sperm whale in winter.

4.3. Risso's dolphin

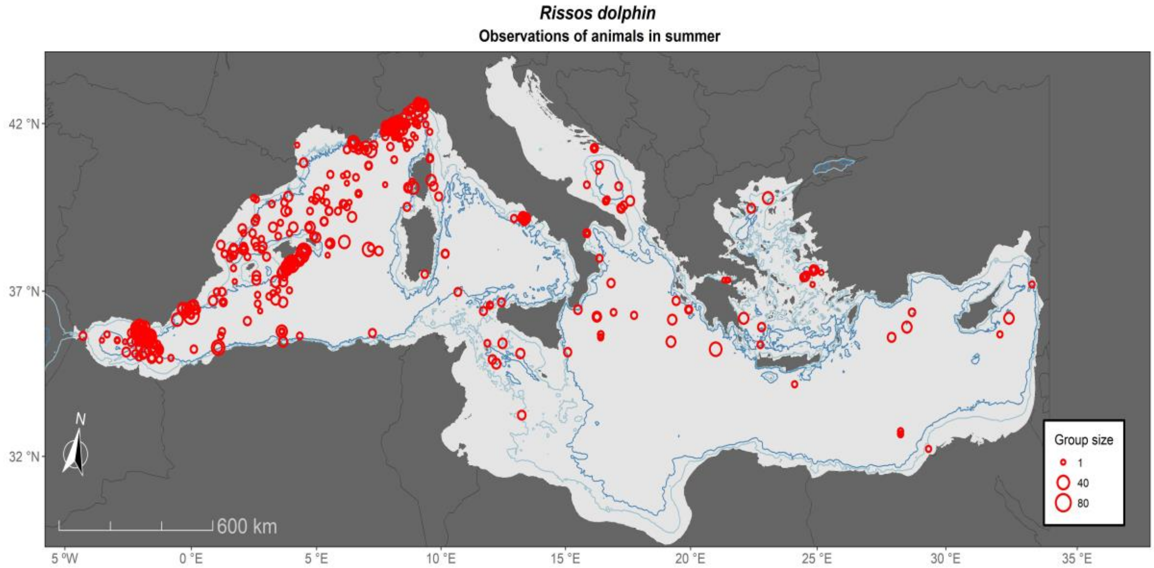

Figure A-31. Map of sightings of Risso's dolphin in summer.

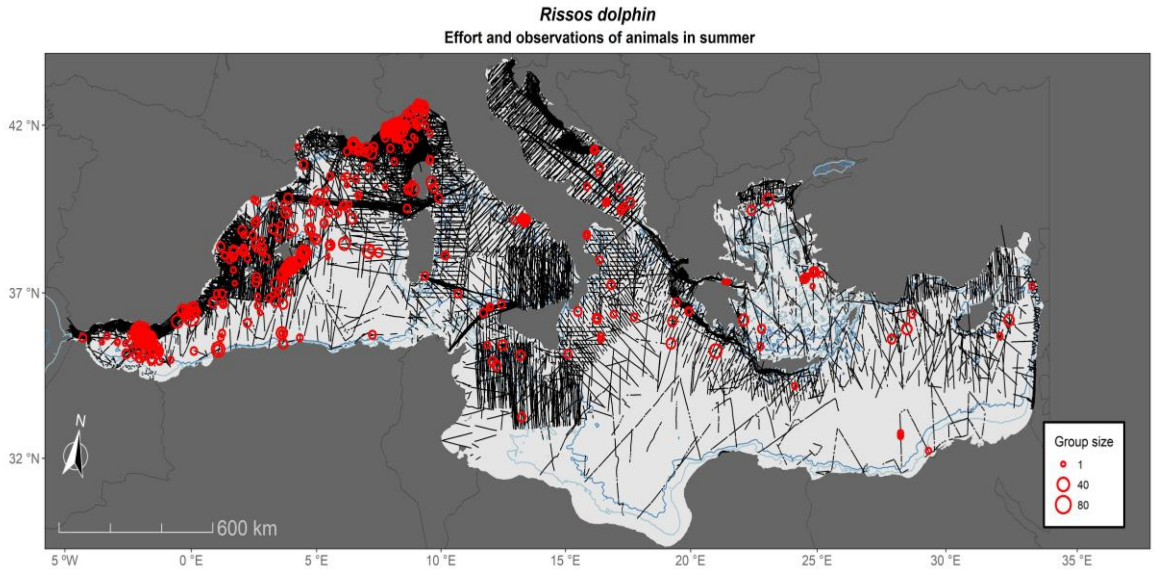

Figure A-32. Map of effort and sightings of Risso's dolphin in summer.

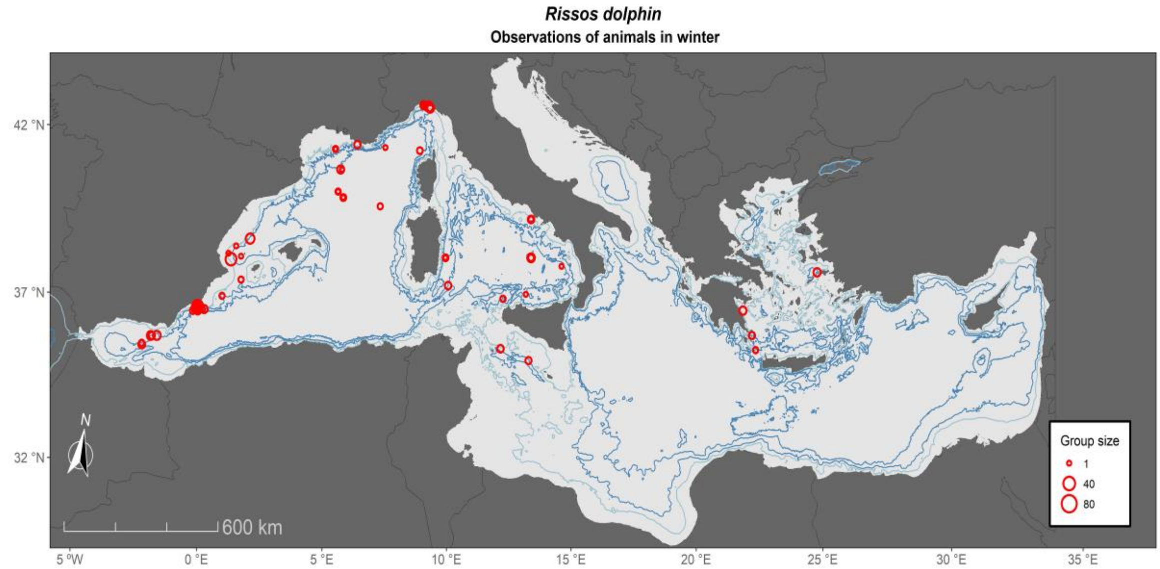

Figure A-33. Map of sightings of Risso's dolphin in winter.

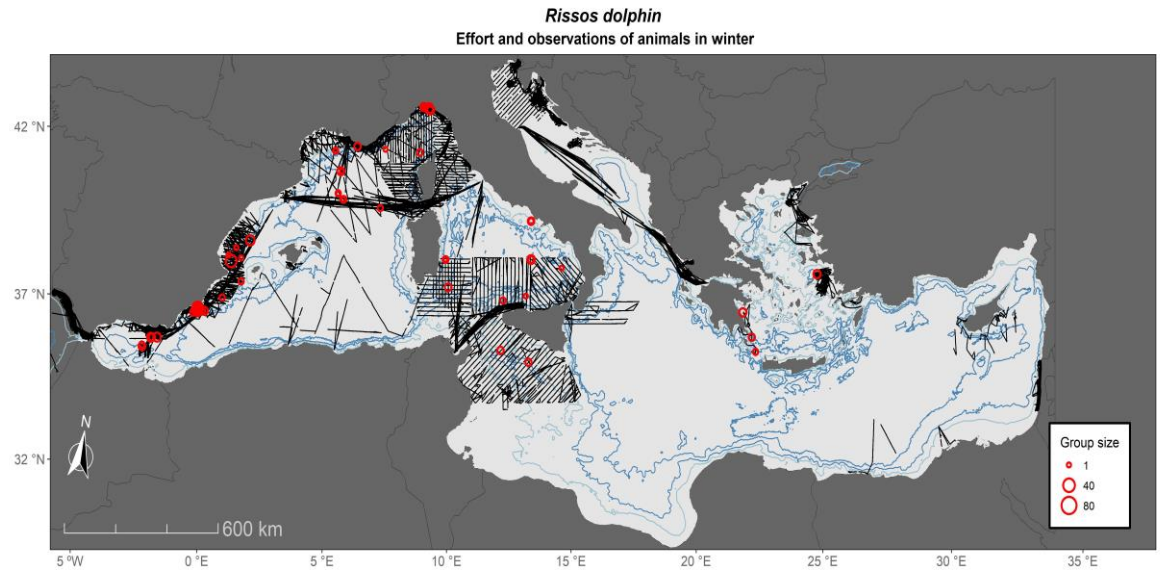

Figure A-34. Map of effort and sightings of Risso's dolphin in winter.

4.4. Long-finned pilot whale

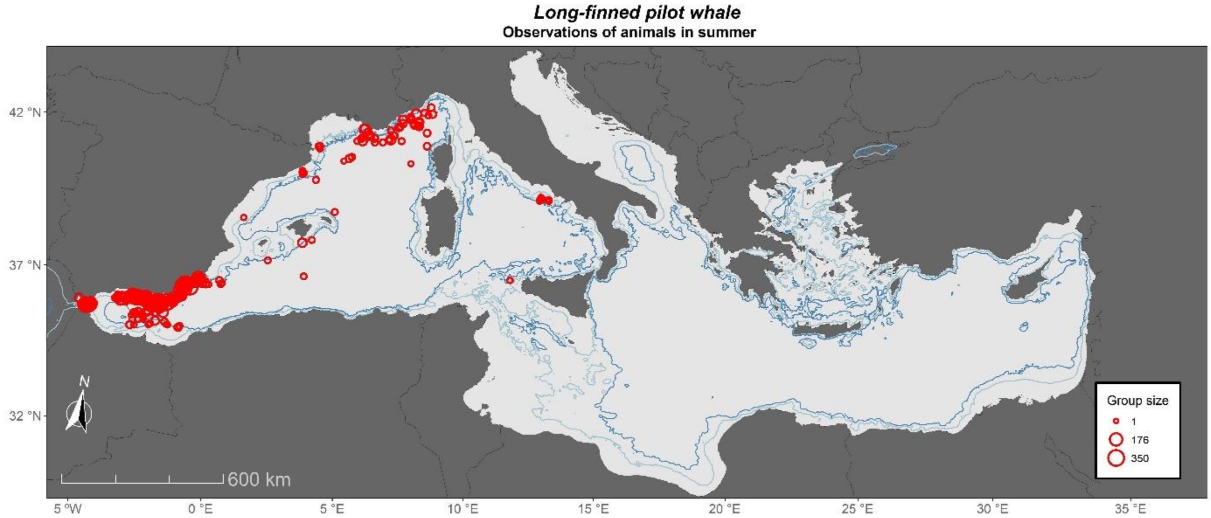

Figure A-35. Map of sightings of long-finned pilot whale in summer.

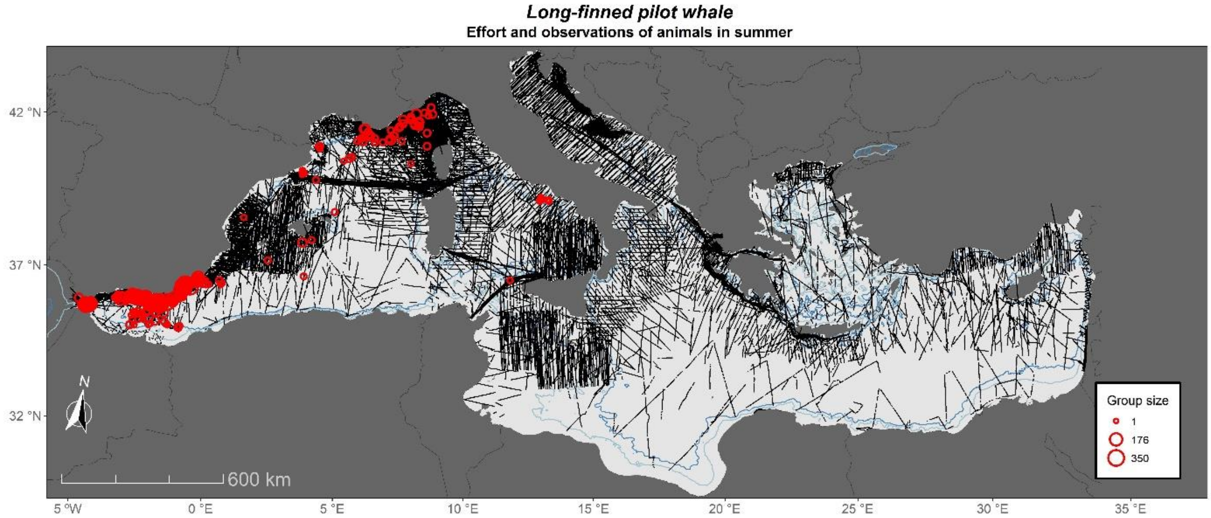

Figure A-36. Map of effort and sightings of long-finned pilot whale in summer.

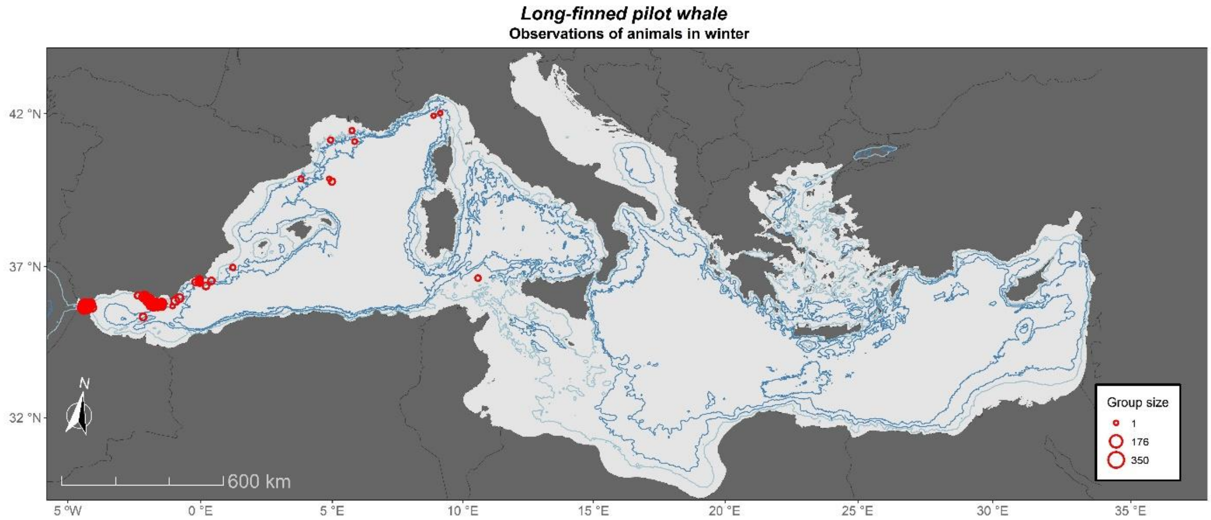

Figure A-37. Map of sightings of long-finned pilot whale in winter.

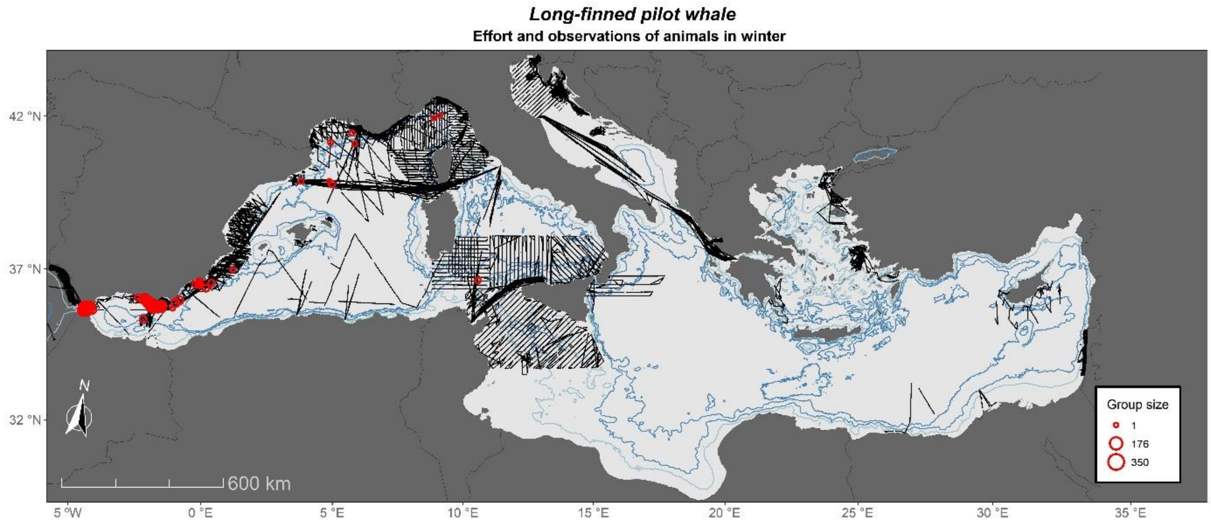

Figure A-38. Map of effort and sightings of long-finned pilot whale in winter.

4.5. Cuvier's beaked whales

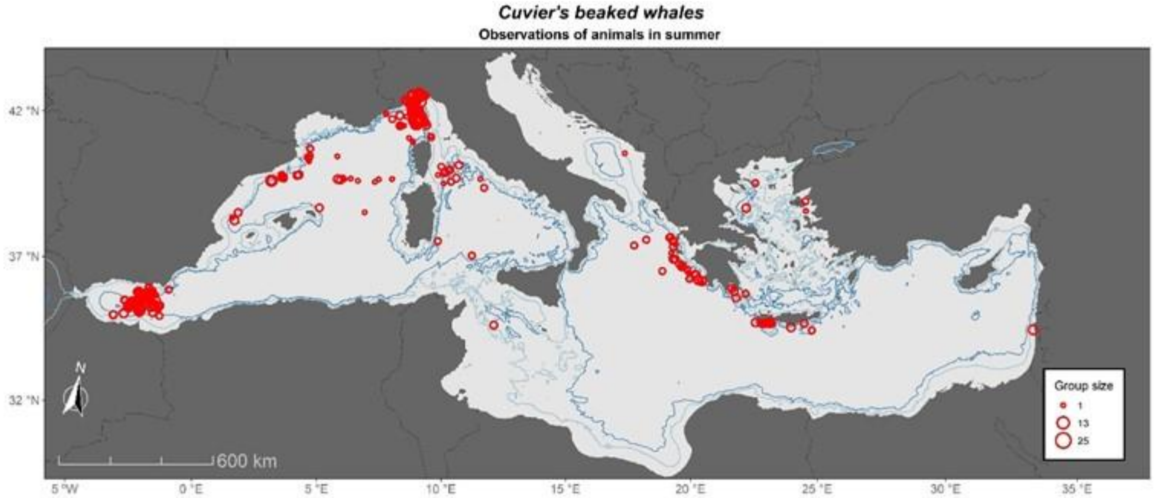

Figure A-39. Map of sightings of Cuvier's beaked whales in summer.

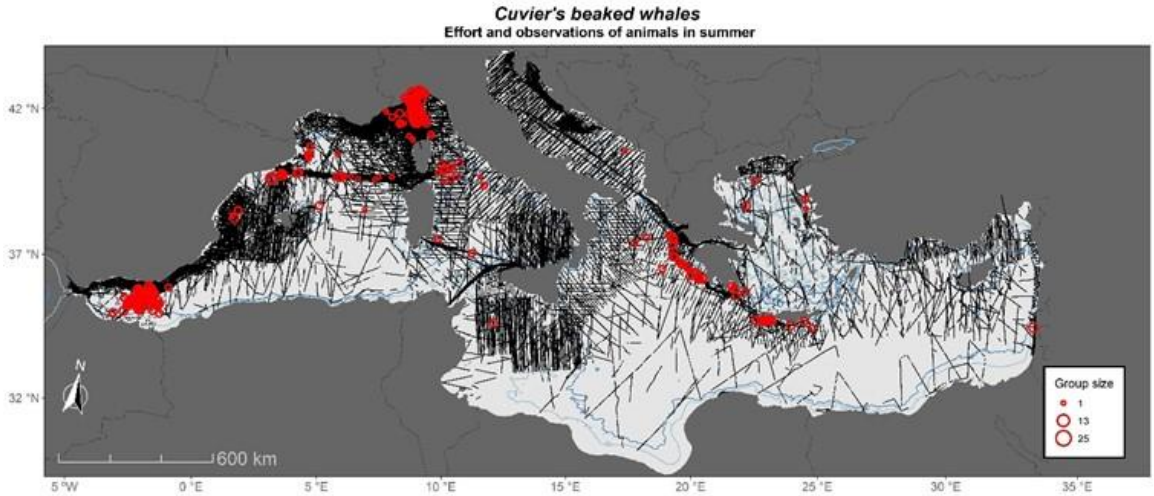

Figure A-40. Map of effort and sightings of Cuvier's beaked whales in summer.

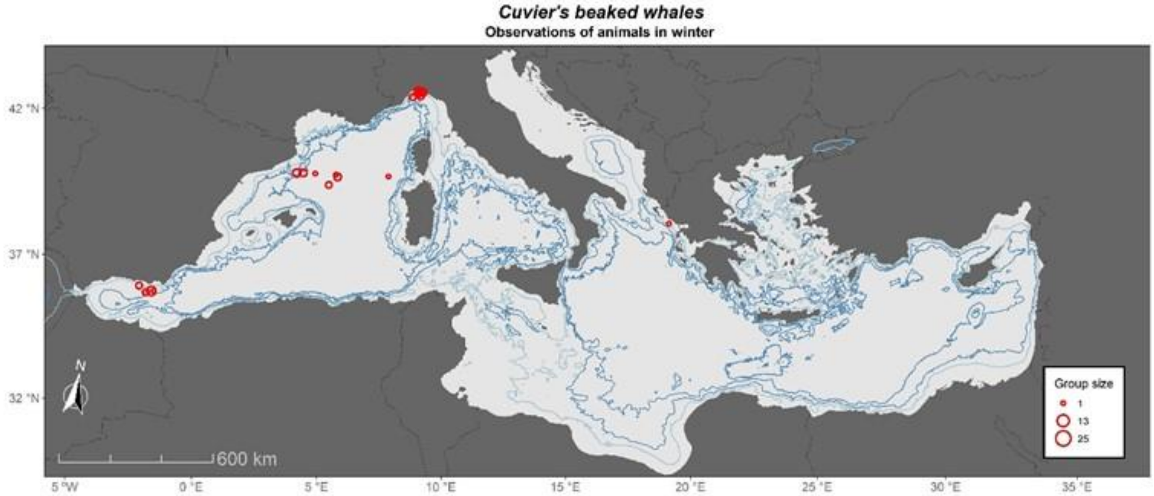

Figure A-41. Map of sightings of Cuvier's beaked whales in winter.

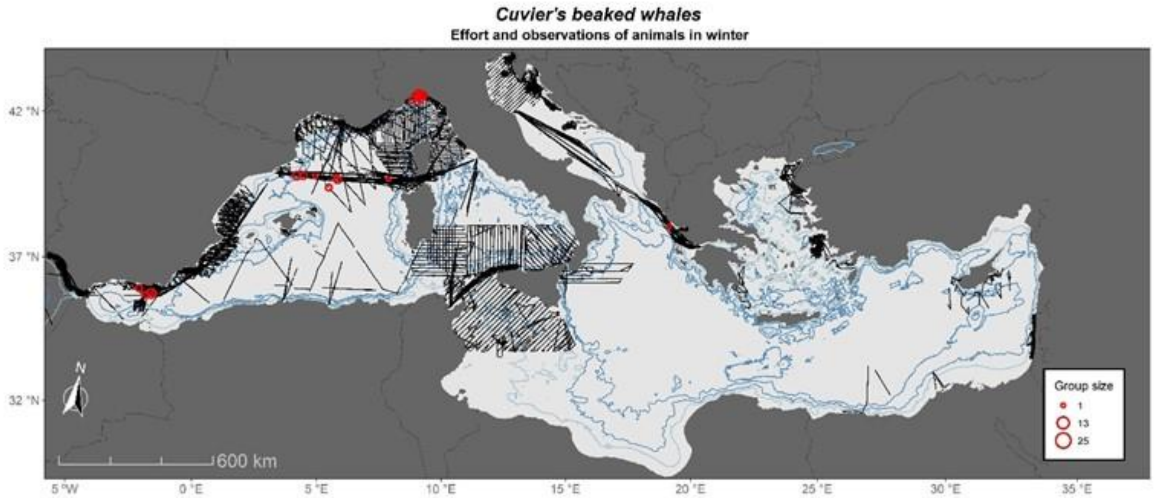

Figure A-42. Map of effort and sightings of Cuvier's beaked whales in winter.

4.6. Bottlenose dolphin

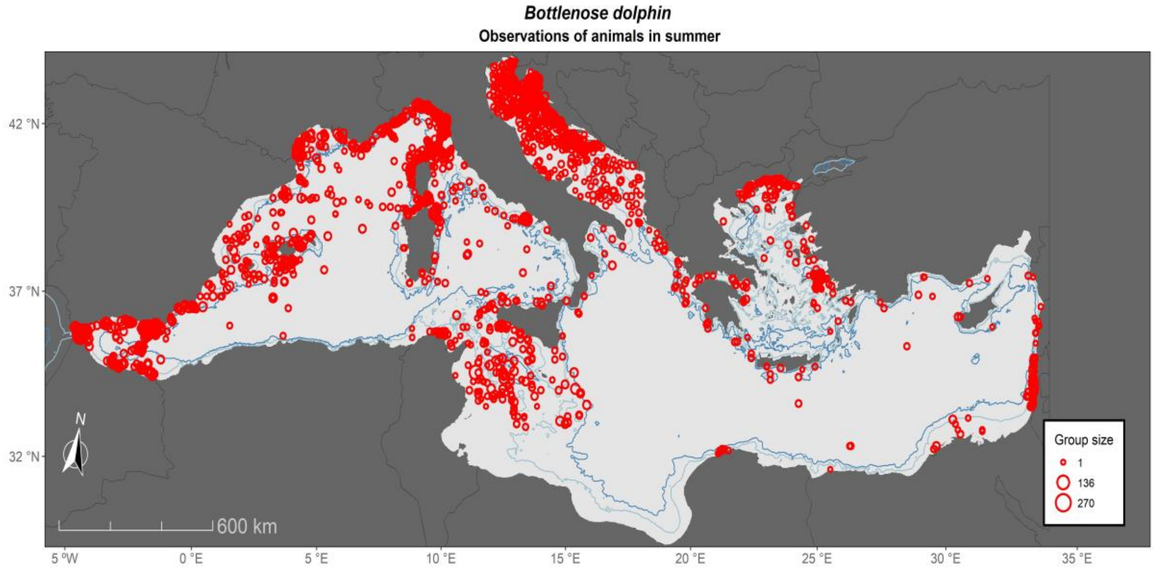

Figure A-43. Map of sightings of bottlenose dolphin in summer.

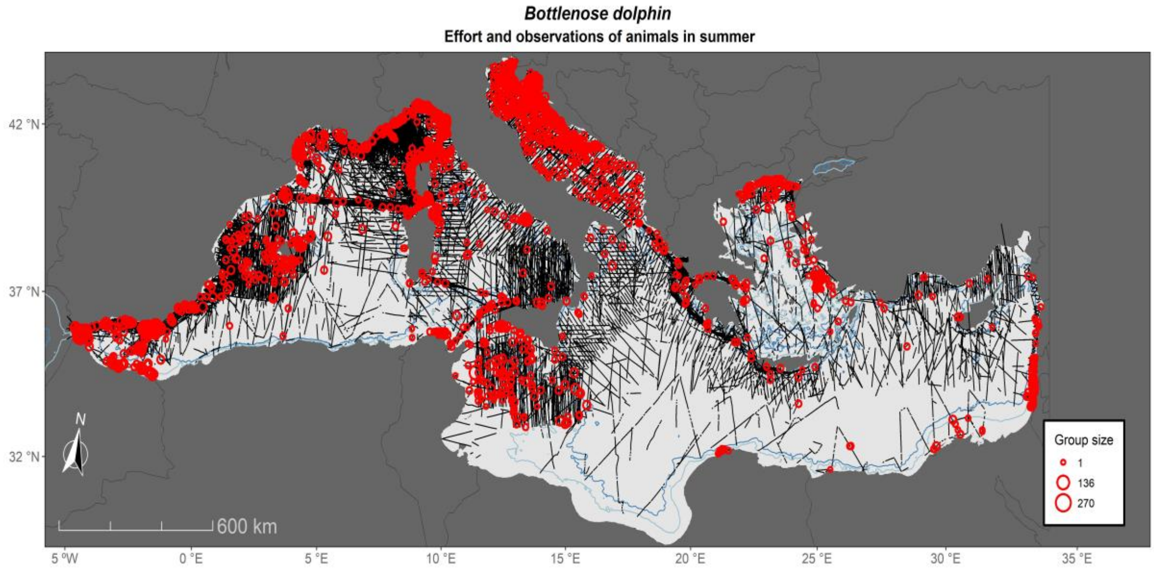

Figure A-44. Map of effort and sightings of bottlenose dolphin in summer.

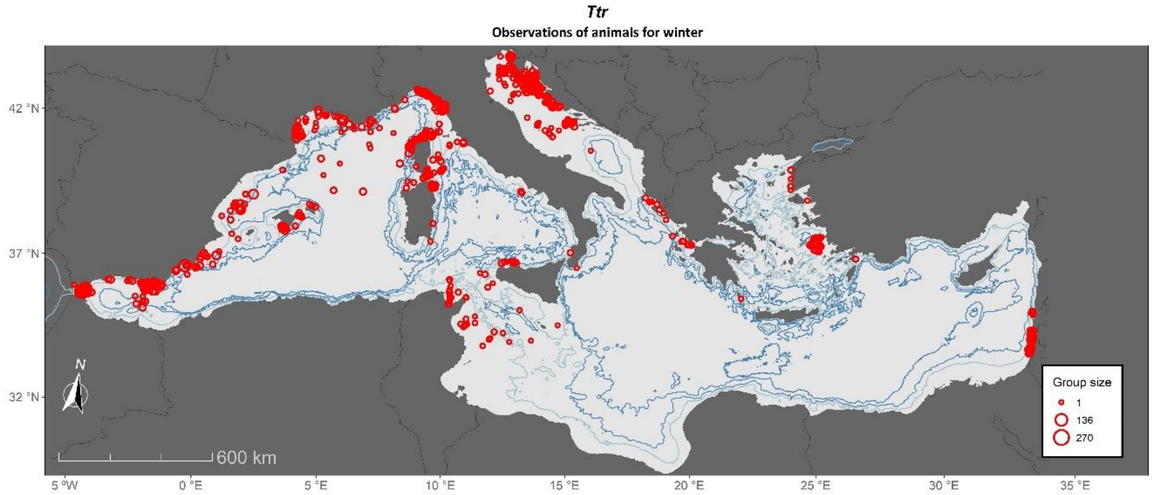

Figure A-45. Map of sightings of bottlenose dolphin in winter.

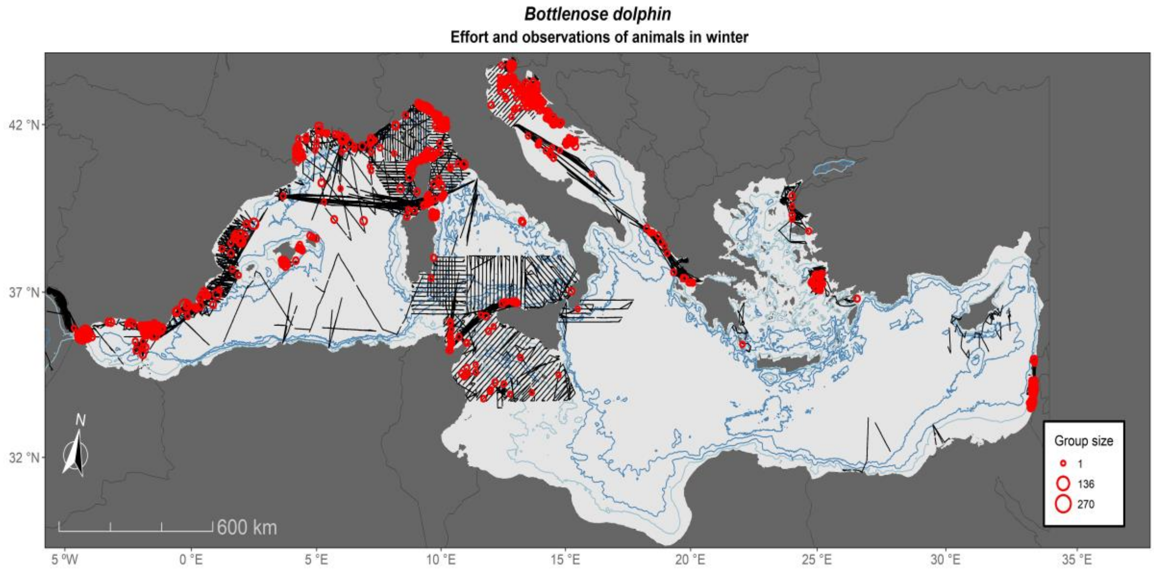

Figure A-46. Map of effort and sightings of bottlenose dolphin in winter.

4.7. Common dolphin

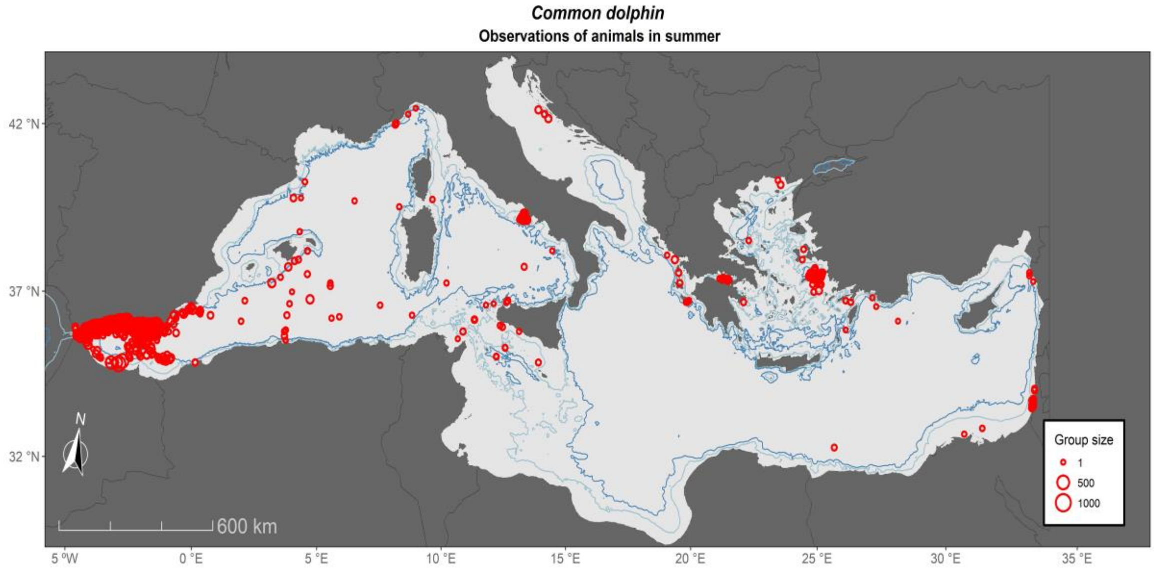

Figure A-47. Map of sightings of common dolphin in summer.

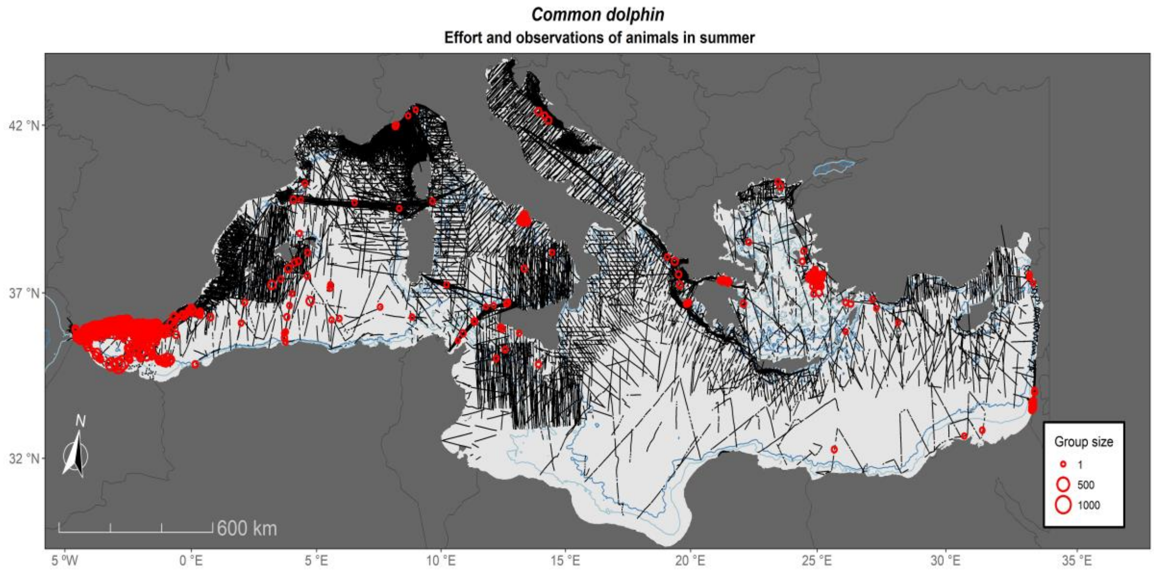

Figure A-48. Map of effort and sightings of common dolphin in summer.

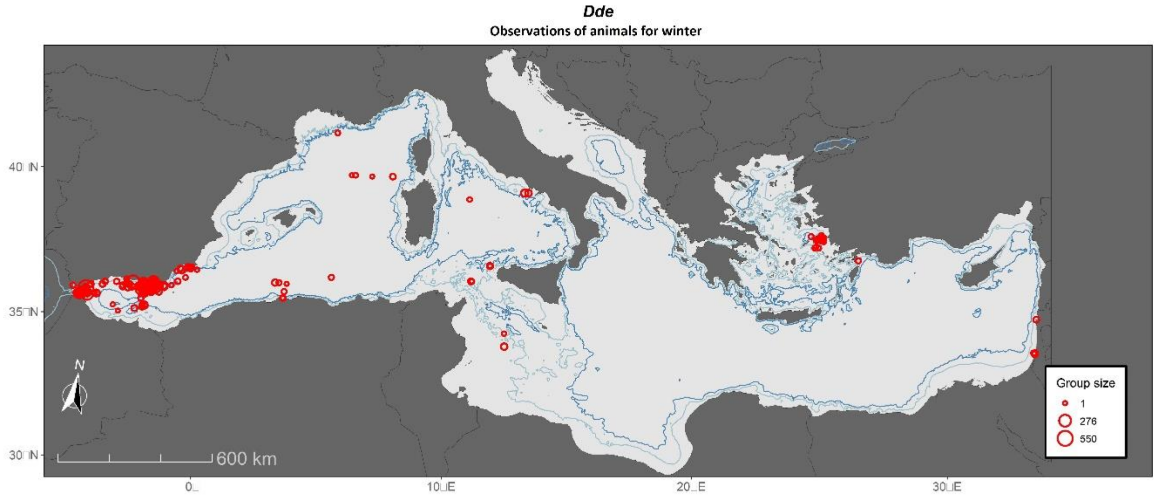

Figure A-49. Map of sightings of common dolphin in winter.

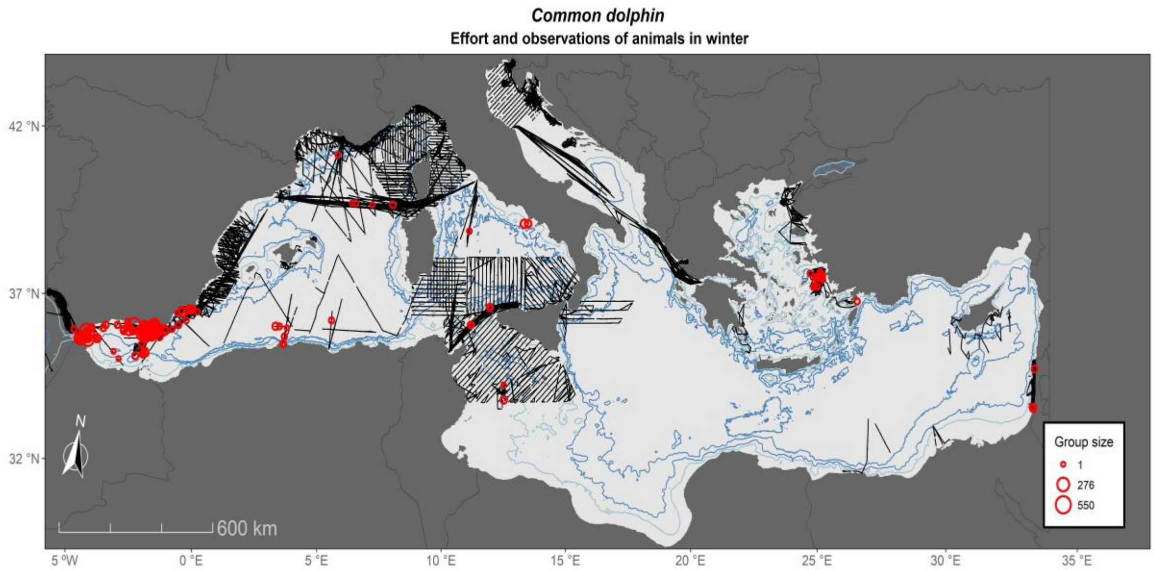

Figure A-50. Map of effort and sightings of common dolphin in winter.

4.8. Striped dolphin

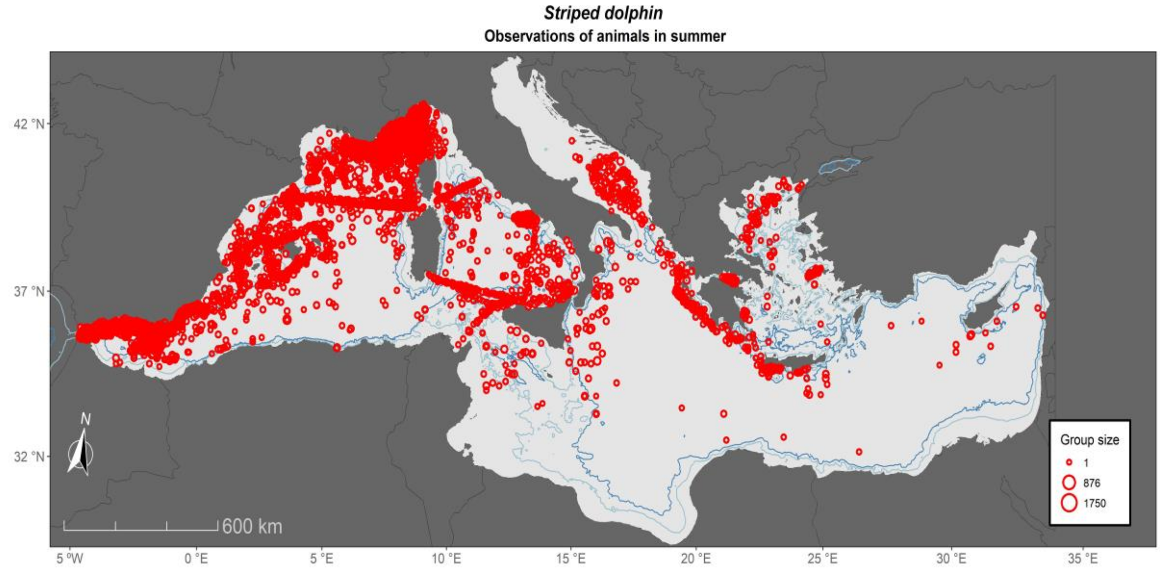

Figure A-51. Map of sightings of striped dolphin in summer.

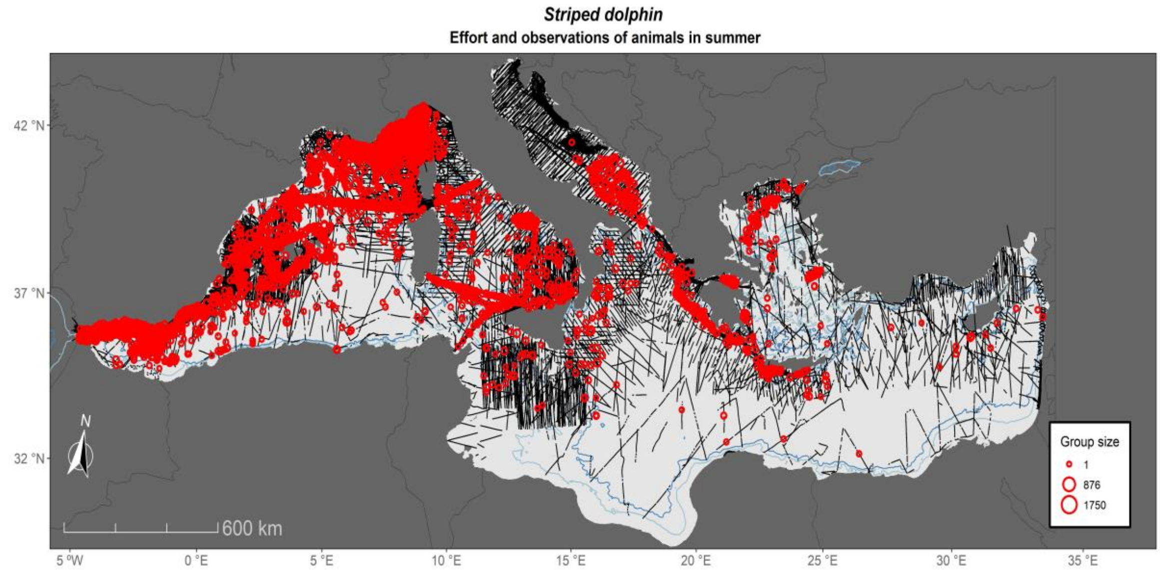

Figure A-52. Map of effort and sightings of striped dolphin in summer.

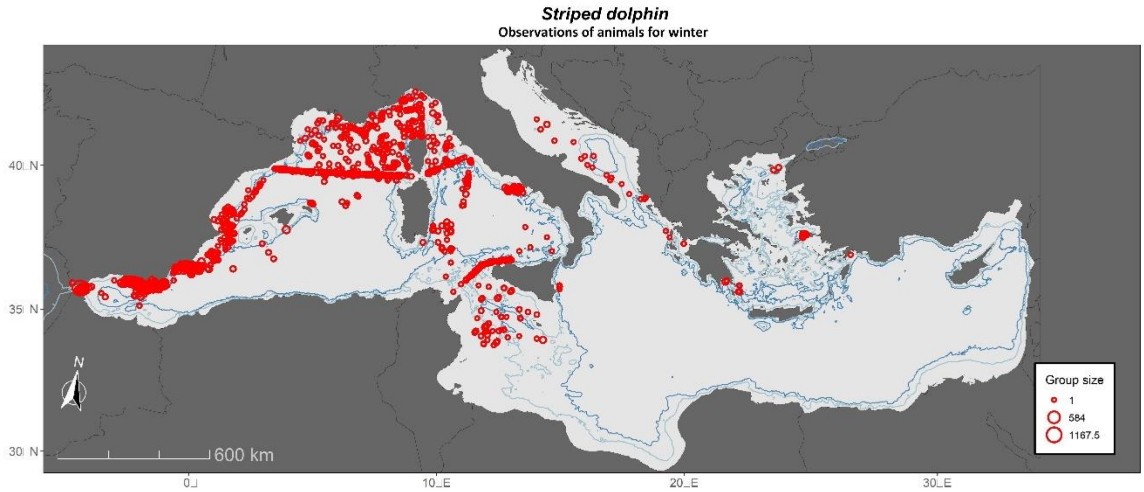

Figure A-53. Map of sightings of striped dolphin in winter.

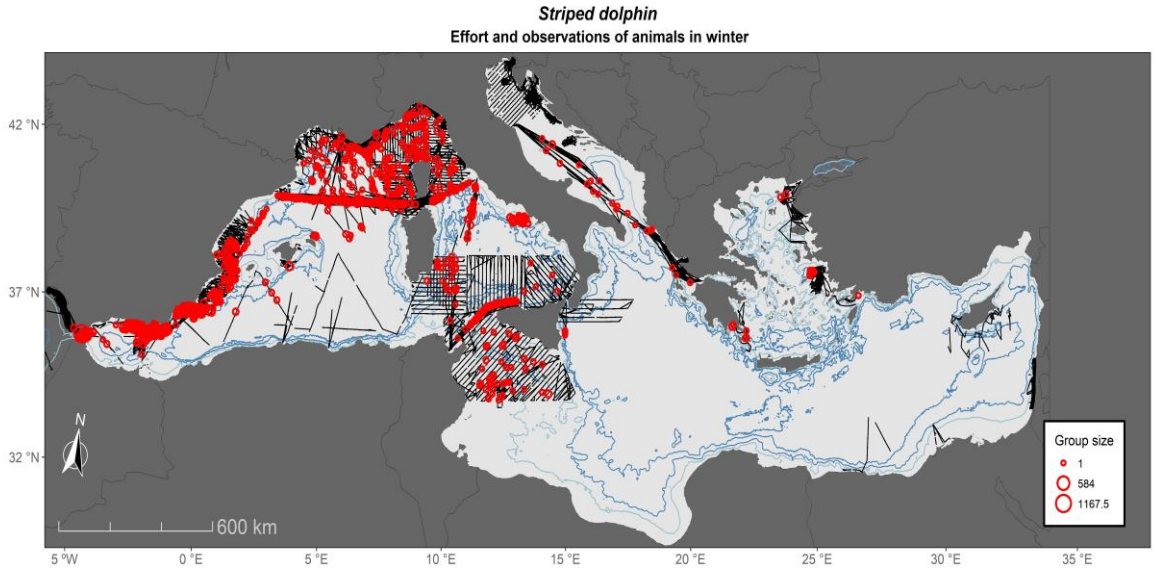

Figure A-54. Map of effort and sightings of striped dolphin in winter.

4.9. Harbor porpoise

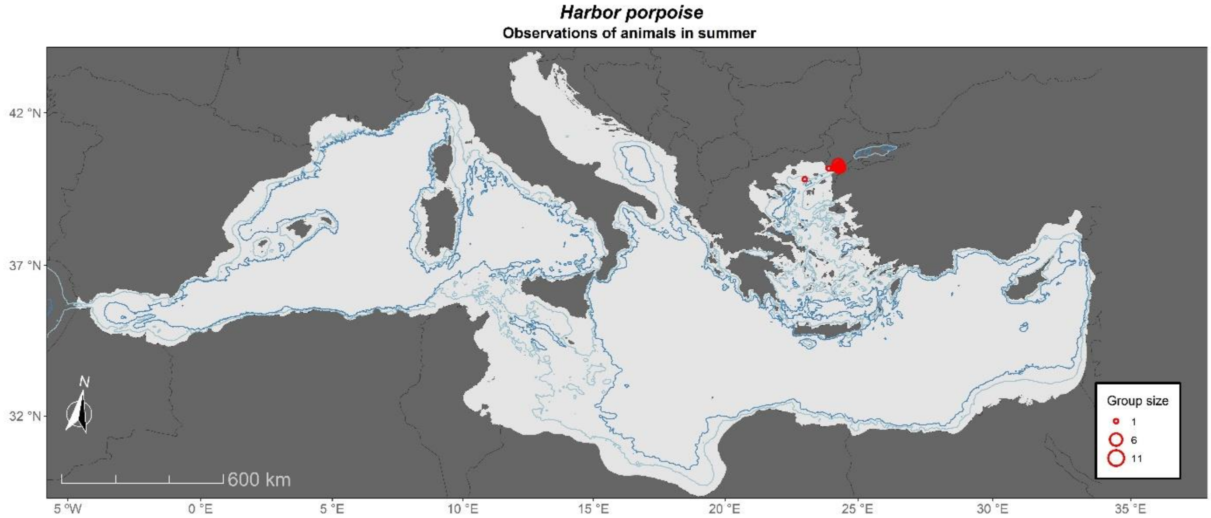

Figure A-55. Map of sightings of harbor porpoise in summer.

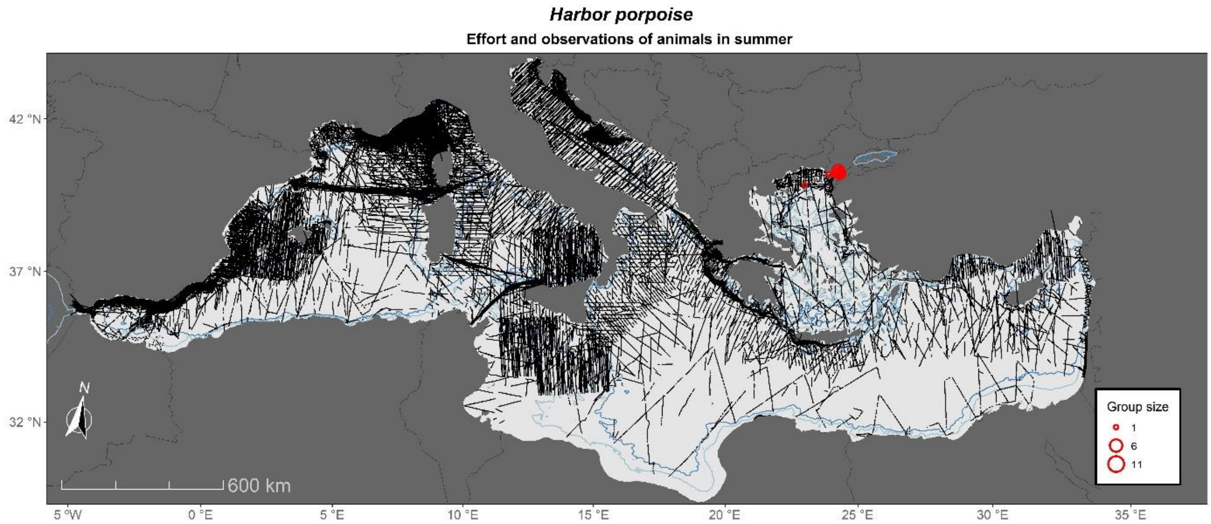

Figure A-56. Map of effort and sightings of harbor porpoise in summer.

4.10. Killer whale

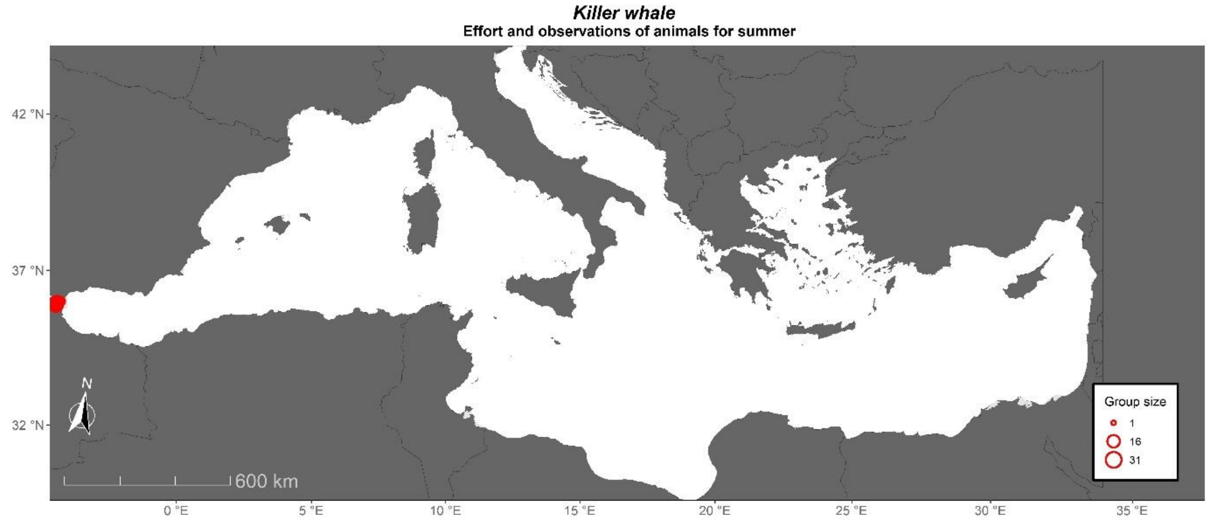

Figure A-57. Map of sightings of killer whale in summer.

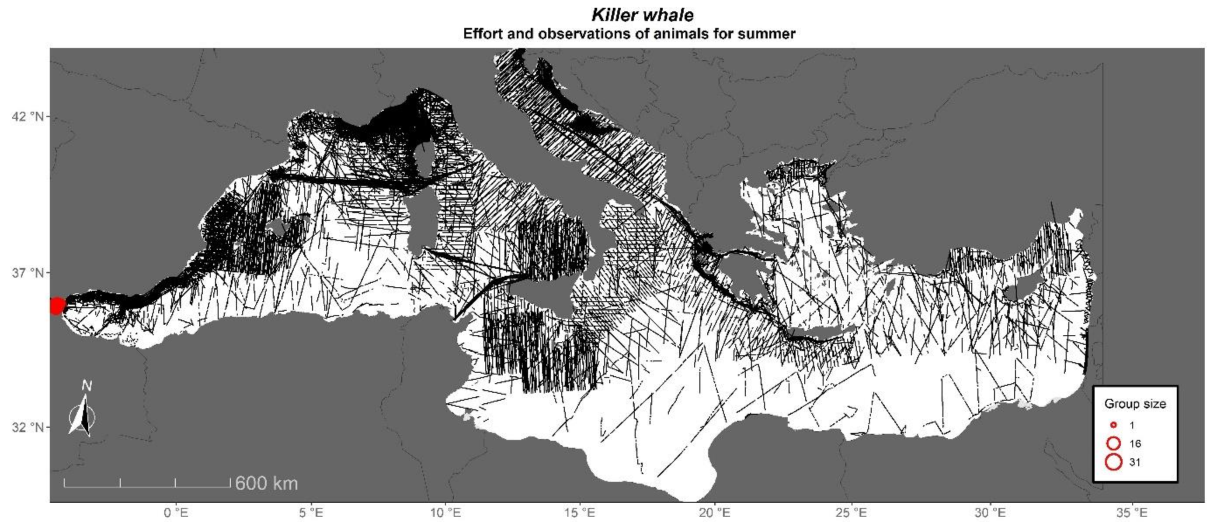

Figure A-58. Map of effort and sightings of killer whale in summer.

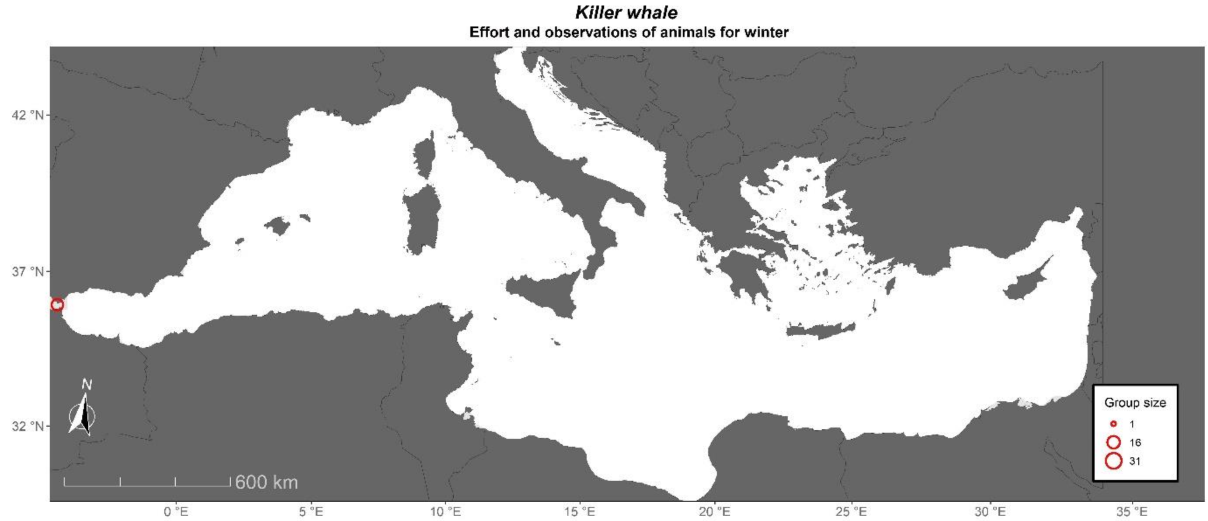

Figure A-59. Map of sightings of killer whale in winter.

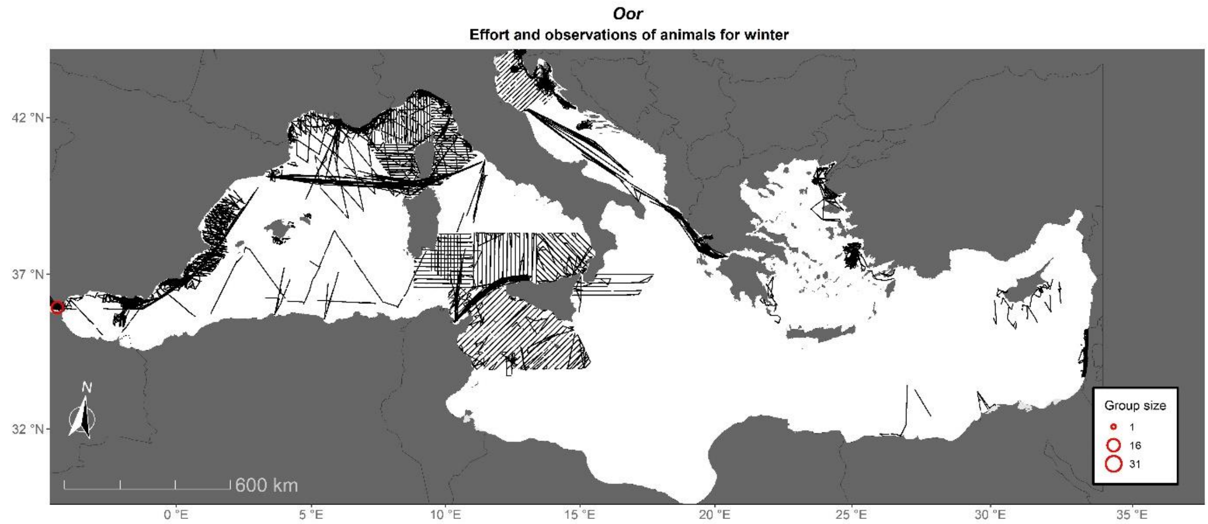

Figure A-60. Map of effort and sightings of killer whale in winter.

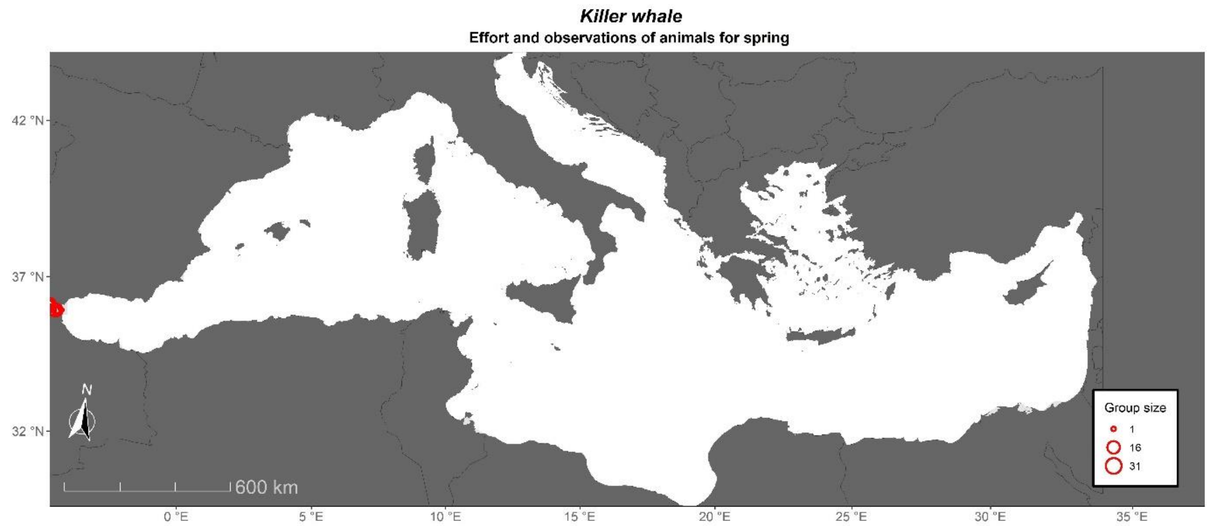

Figure A-61. Map of sightings of killer whale in spring.

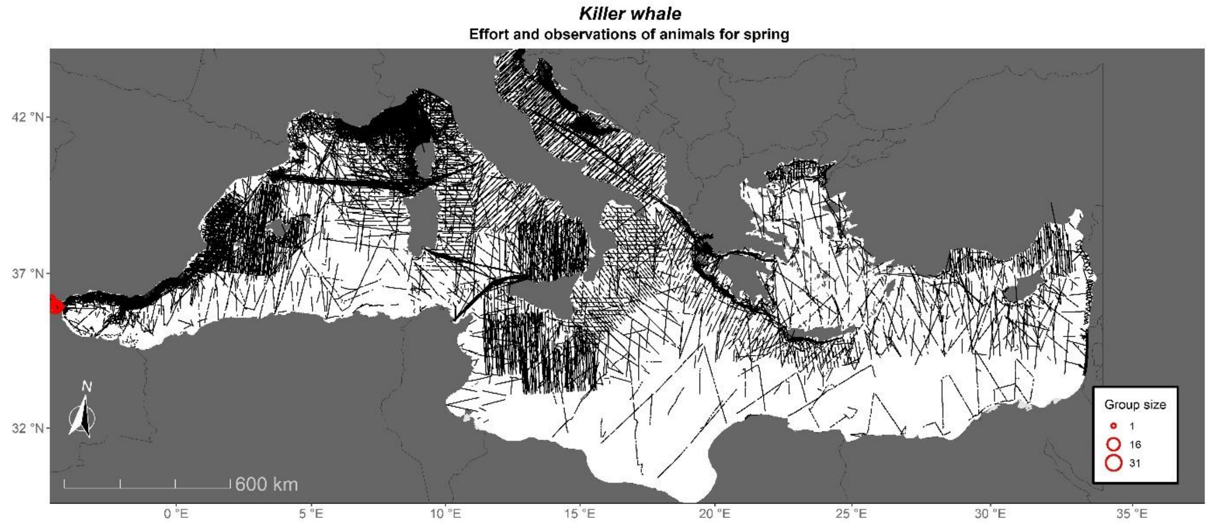

Figure A-62. Map of effort and sightings of killer whale in spring.

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B

Maps of encounter rates

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Appendix B: Maps of encounter rates

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1. Maps of encounter rates for the Marmara Sea

1.1. Bottlenose dolphin

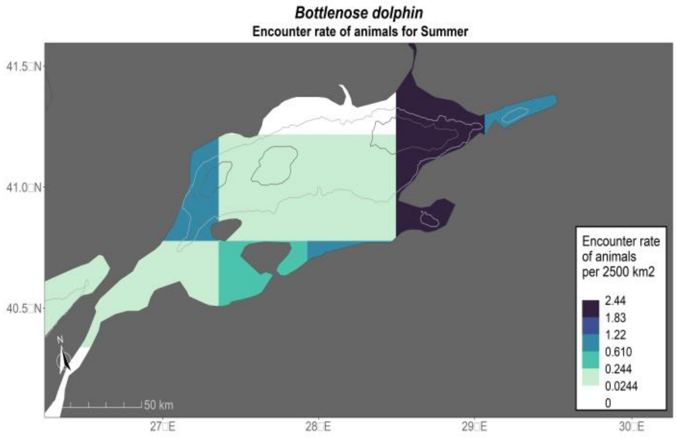

Figure B-1. Map of encounter rates of bottlenose dolphin in summer.

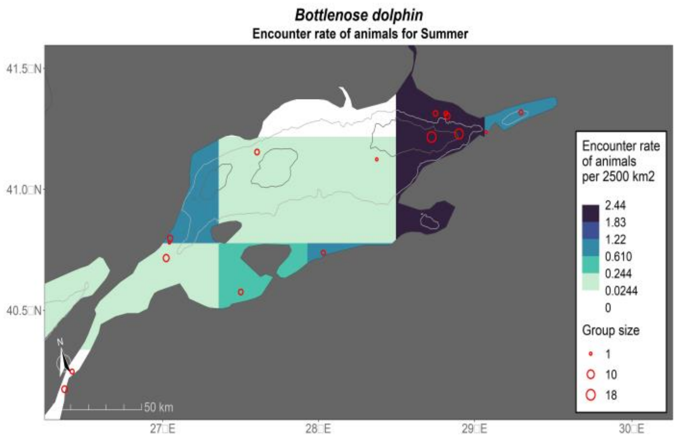

Figure B-2. Map of encounter rates of bottlenose dolphin in summer, with observations.

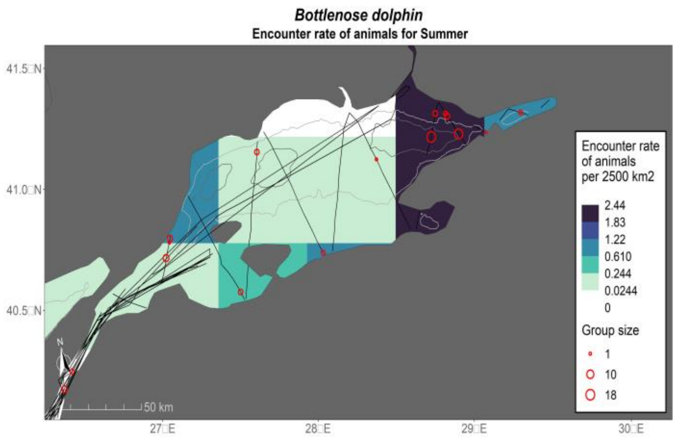

Figure B-3. Map of encounter rates of bottlenose dolphin in summer, with observations and tracks.

1.2. Common dolphin

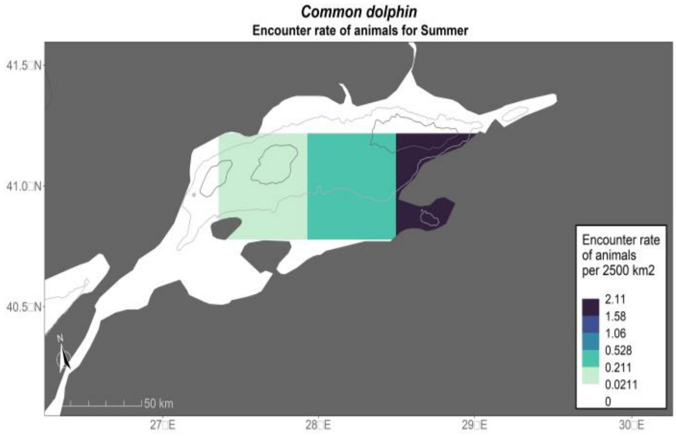

Figure B-4. Map of encounter rates of common dolphin in summer.

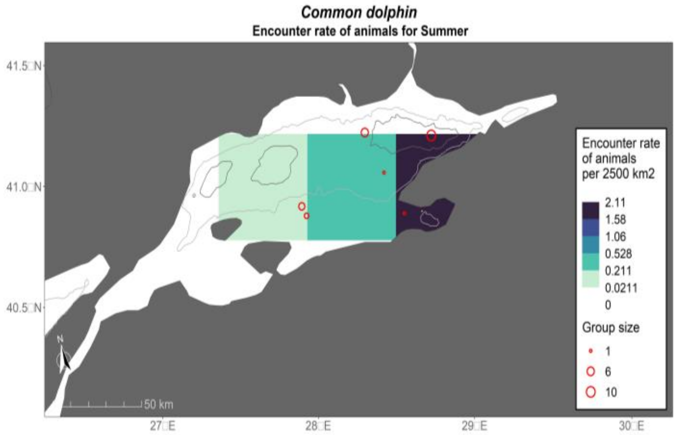

Figure B-5. Map of encounter rates of common dolphin in summer, with observations.

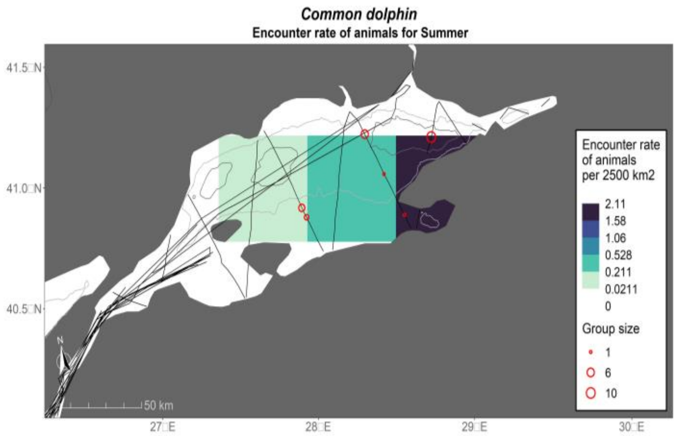

Figure B-6. Map of encounter rates of common dolphin in summer, with observations and tracks.

1.3. Harbor porpoise

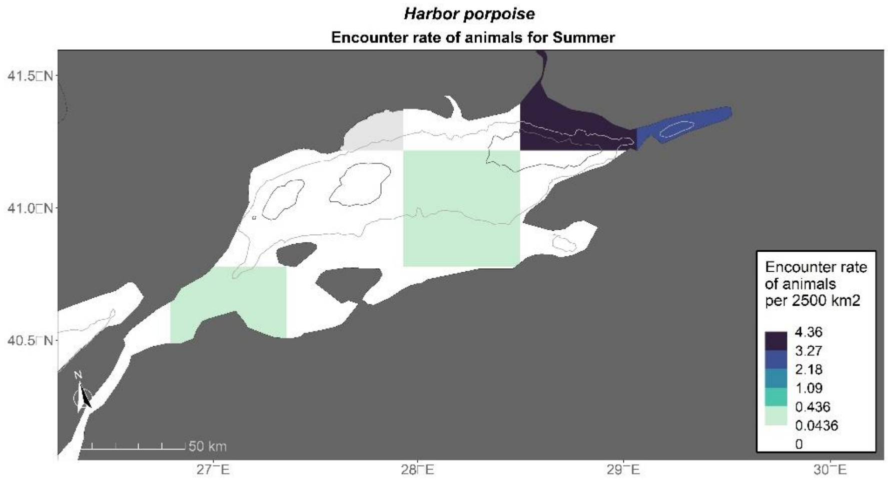

Figure B-7. Map of encounter rates of harbor porpoise in summer.

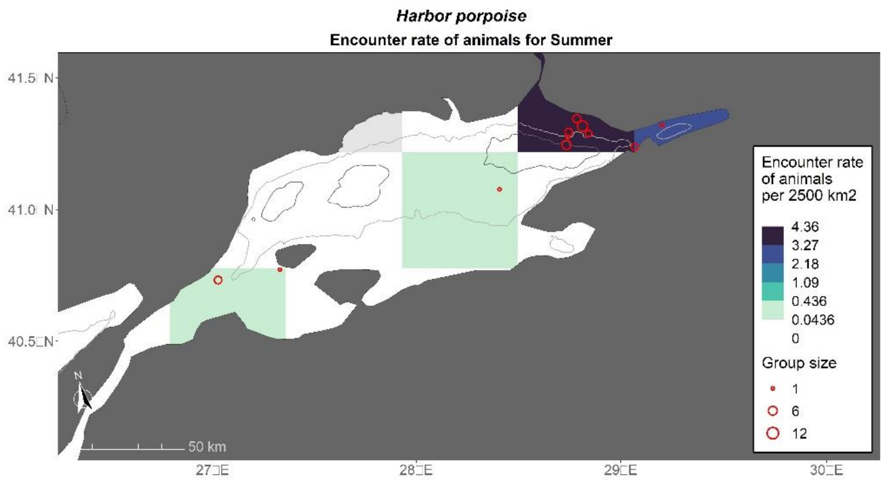

Figure B-8. Map of encounter rates of harbor porpoise in summer, with observations.

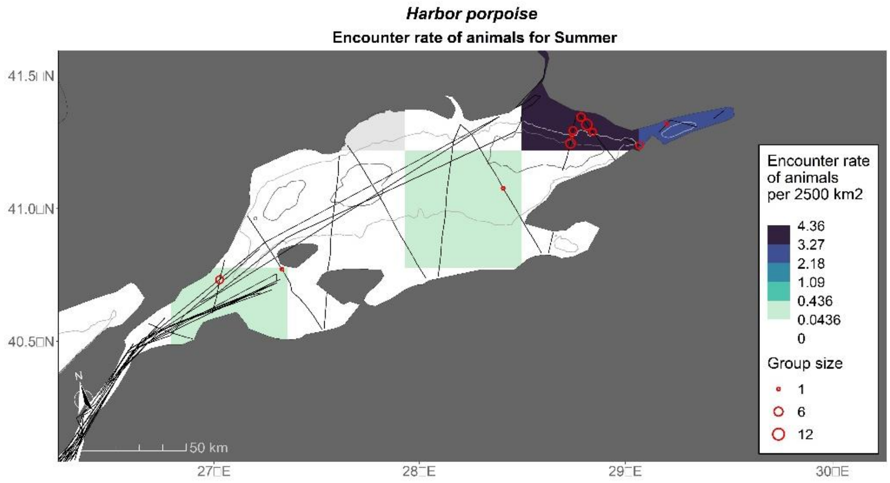

Figure B-9. Map of encounter rates of harbor porpoise in summer, with observations and tracks.

2. Maps of encounter rates for the Azov Sea

2.1. Bottlenose dolphin

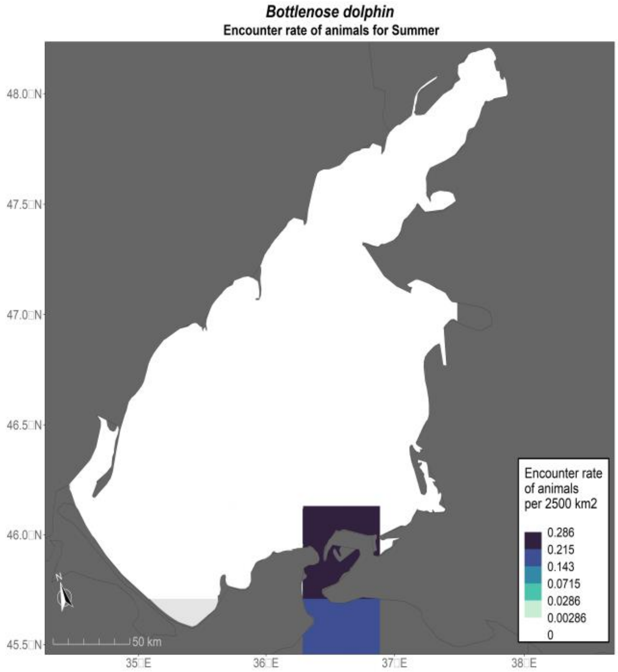

Figure B-10. Map of encounter rates of bottlenose dolphin in summer.

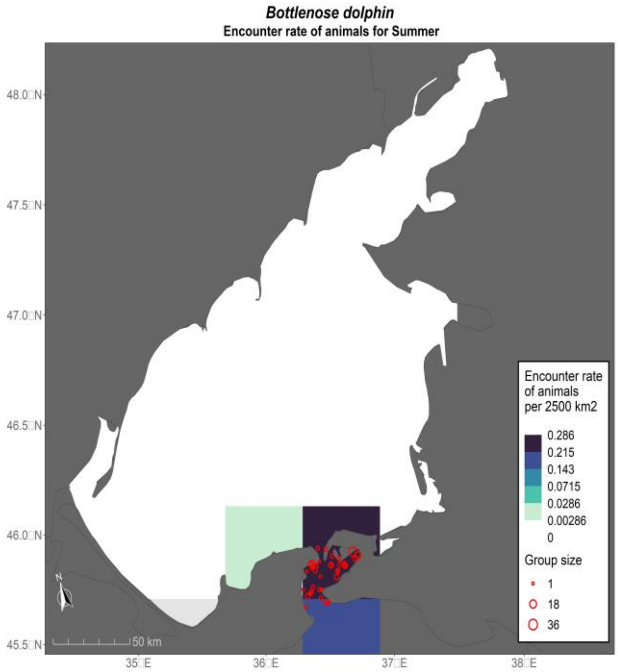

Figure B-11. Map of encounter rates of bottlenose dolphin in summer, with observations.

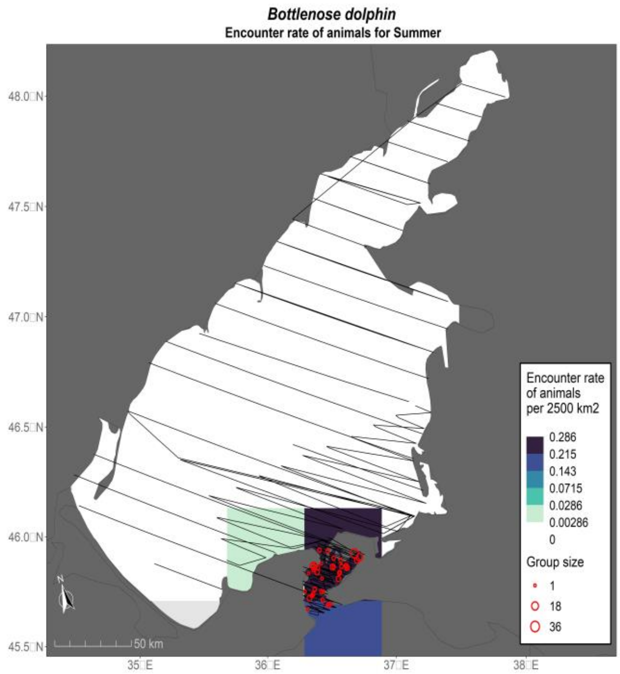

Figure B-12. Map of encounter rates of bottlenose dolphin in summer, with observations and tracks.

2.2. Harbor porpoise

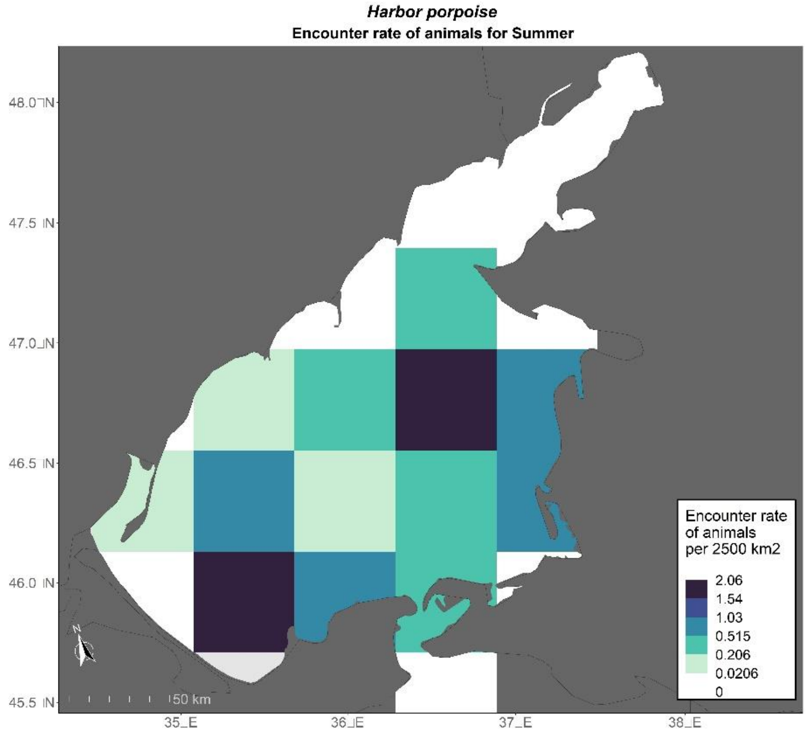

Figure B-13. Map of encounter rates of harbor porpoise in summer.

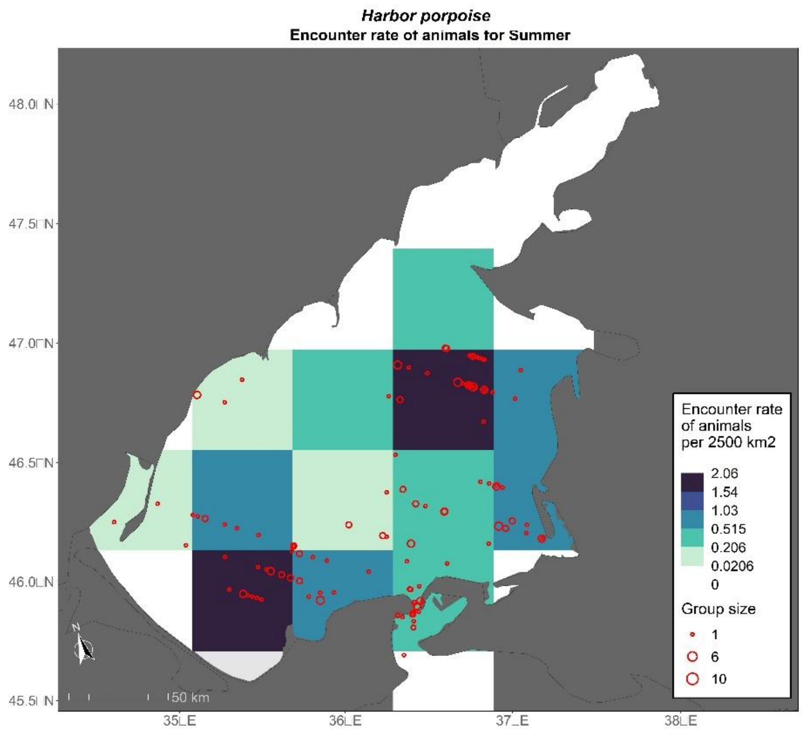

Figure B-14. Map of encounter rates of harbor porpoise in summer, with observations.

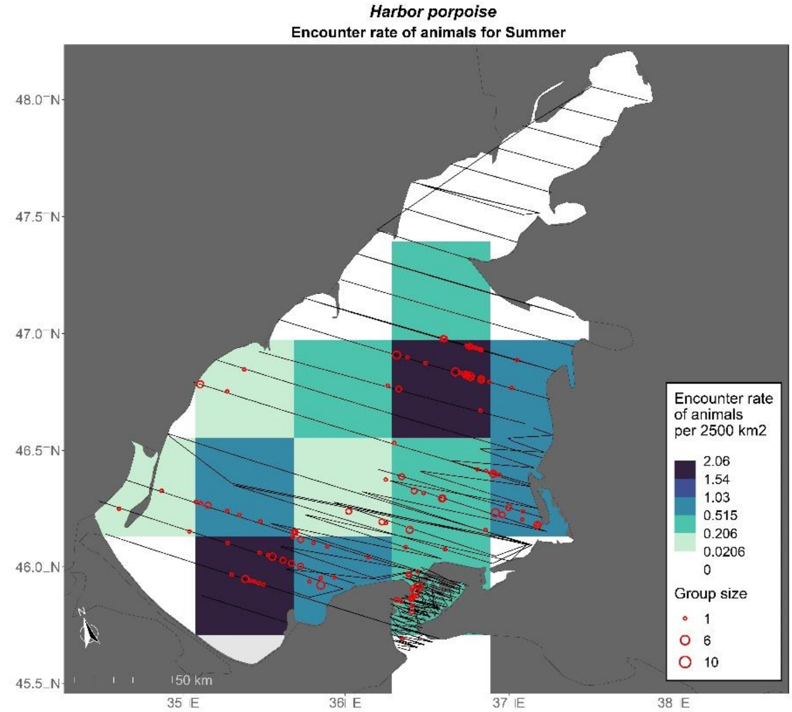

Figure B-15. Map of encounter rates of harbor porpoise in summer, with observations and tracks.

3. Maps of encounter rates for the Black Sea

3.1. Bottlenose dolphin

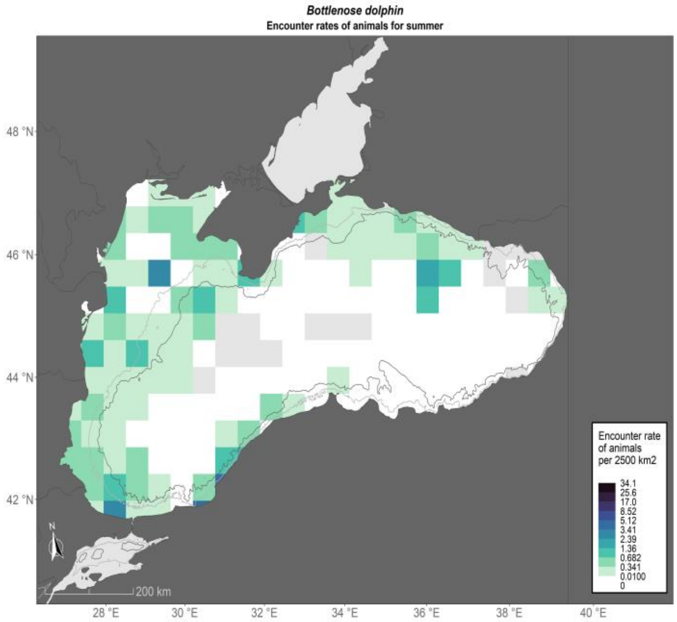

Figure B-16. Map of encounter rates of bottlenose dolphin in summer.

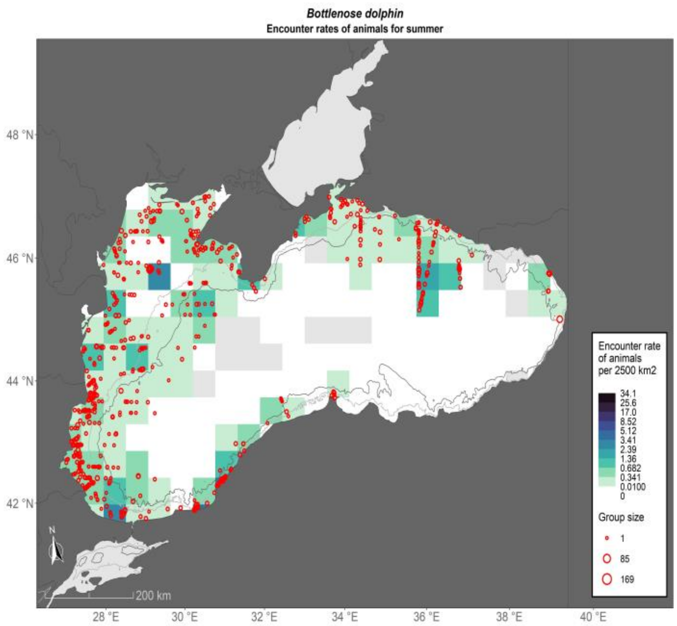

Figure B-17. Map of encounter rates of bottlenose dolphin in summer, with observations.

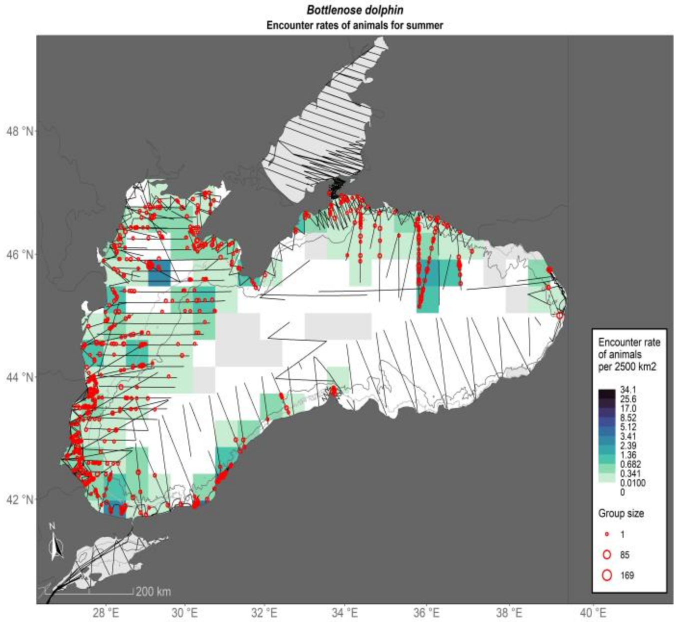

Figure B-18. Map of encounter rates of bottlenose dolphin in summer, with observations and tracks.

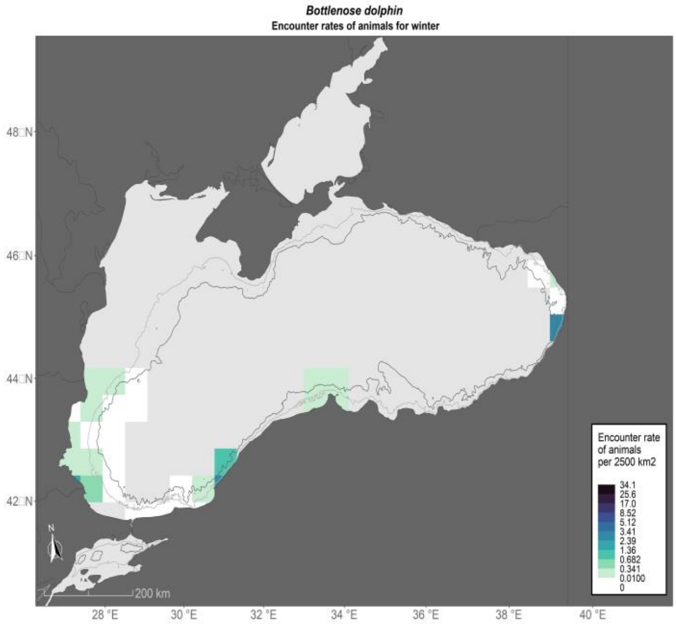

Figure B-19. Map of encounter rates of bottlenose dolphin in winter.

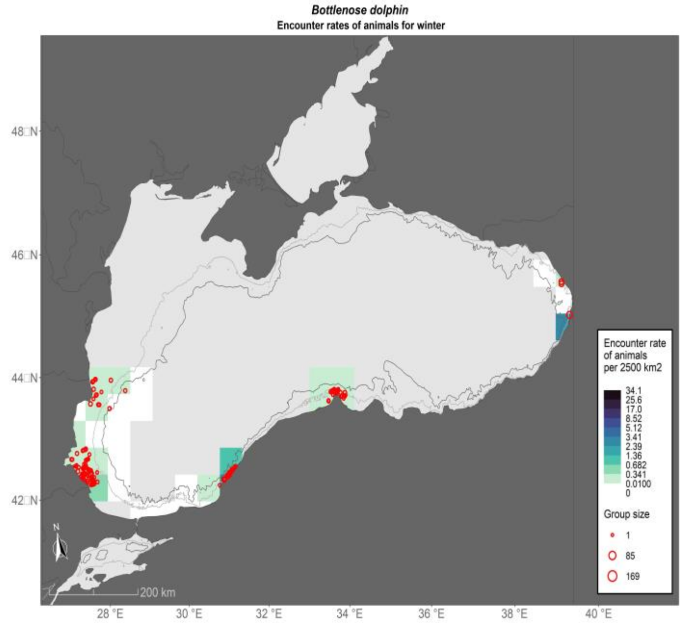

Figure B-20. Map of encounter rates of bottlenose dolphin in winter, with observations.

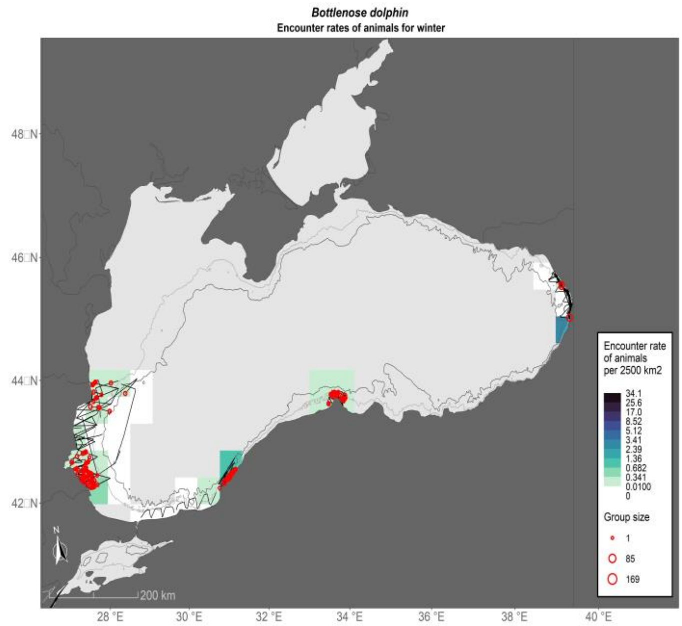

Figure B-21. Map of encounter rates of bottlenose dolphin in winter, with observations and tracks.

3.2. Common dolphin

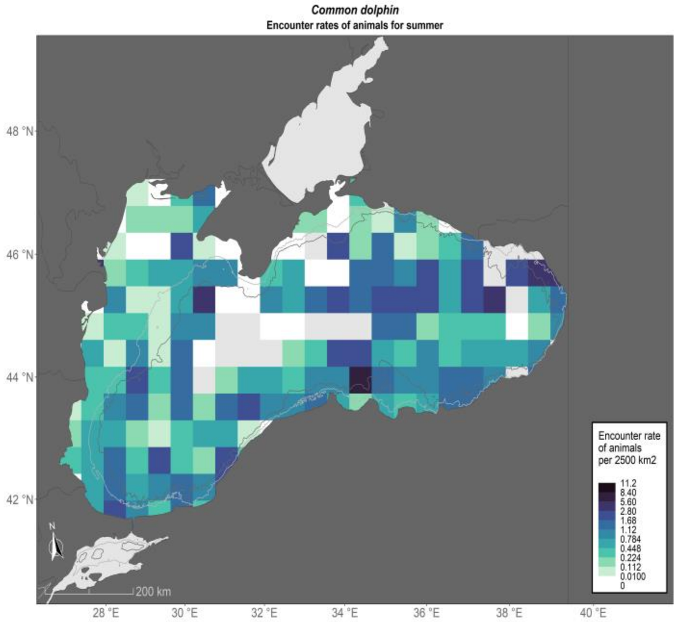

Figure B-22. Map of encounter rates of common dolphin in summer.

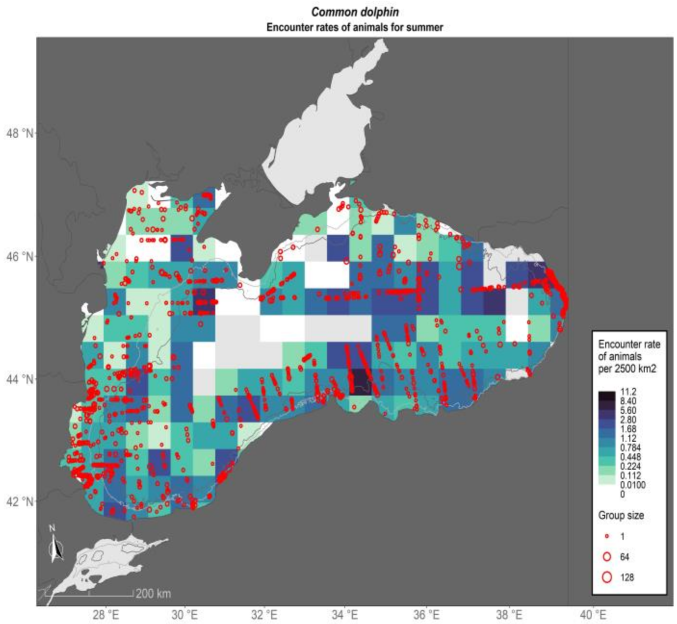

Figure B-23. Map of encounter rates of common dolphin in summer, with observations.

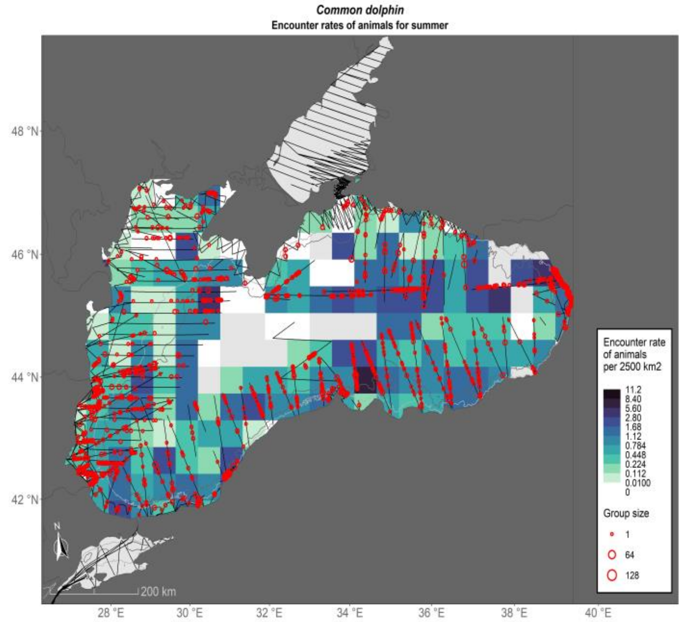

Figure B-24. Map of encounter rates of common dolphin in summer, with observations and tracks.

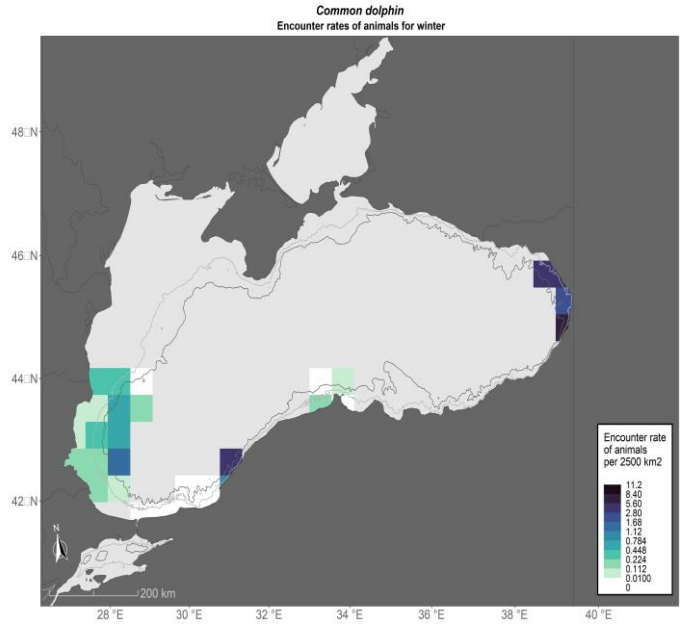

Figure B-25. Map of encounter rates of common dolphin in winter.

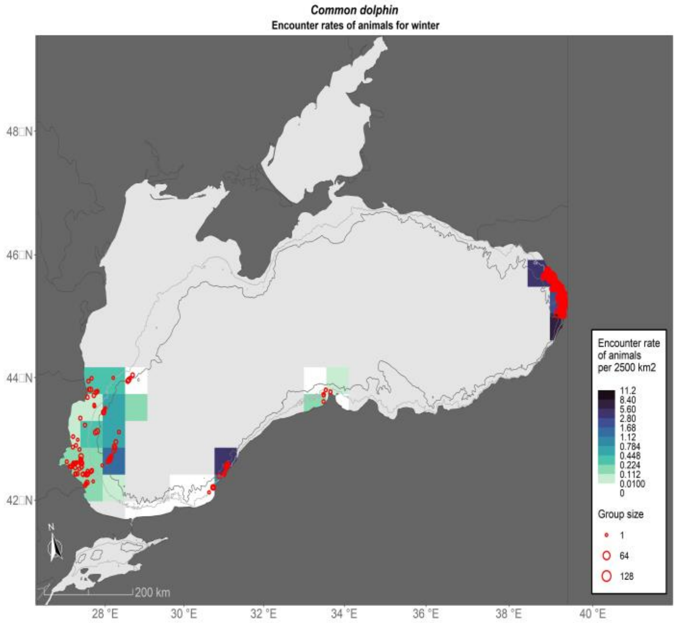

Figure B-26. Map of encounter rates of common dolphin in winter, with observations.

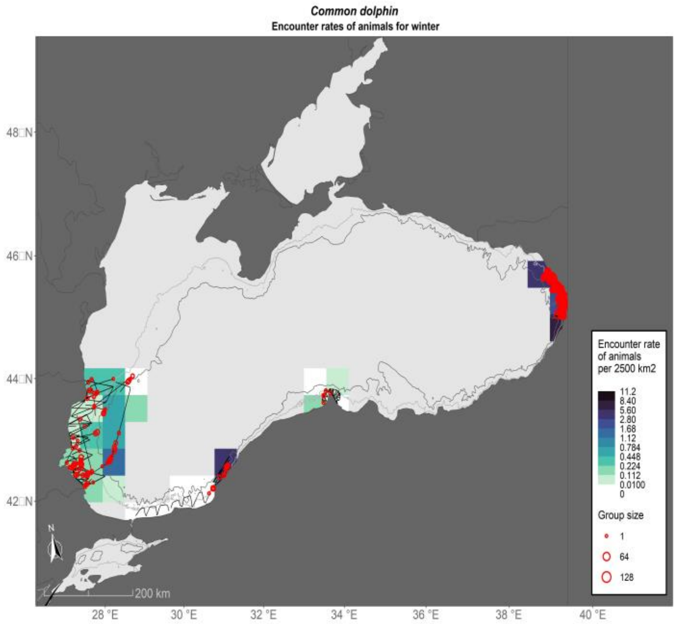

Figure B-27. Map of encounter rates of common dolphin in winter, with observations and tracks.

3.3. Harbor porpoise

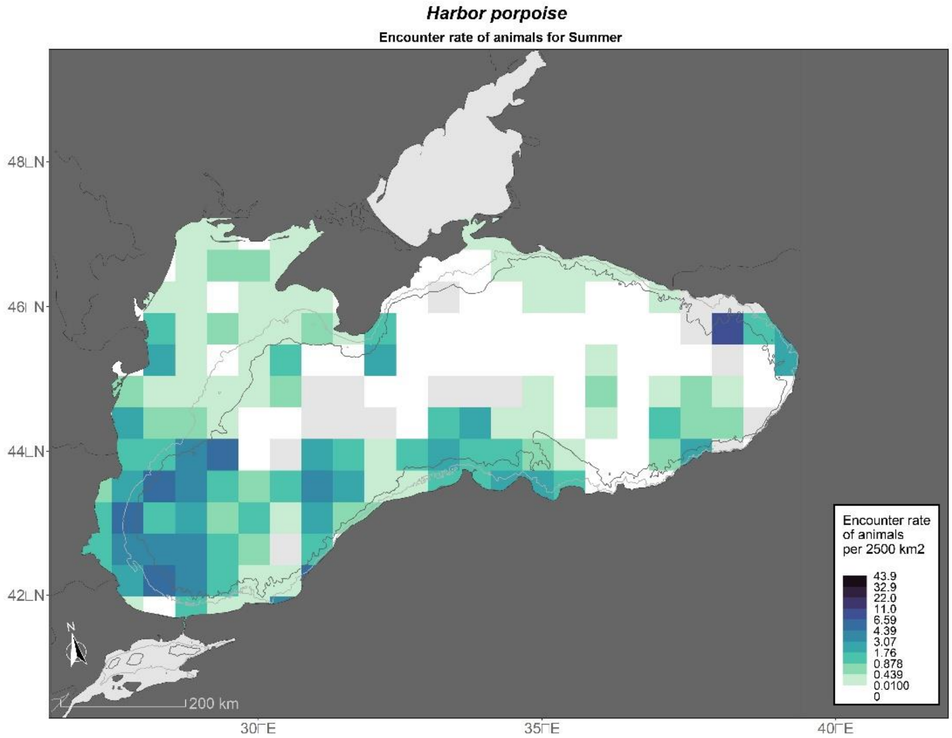

Figure B-28. Map of encounter rates of harbor porpoise in summer.

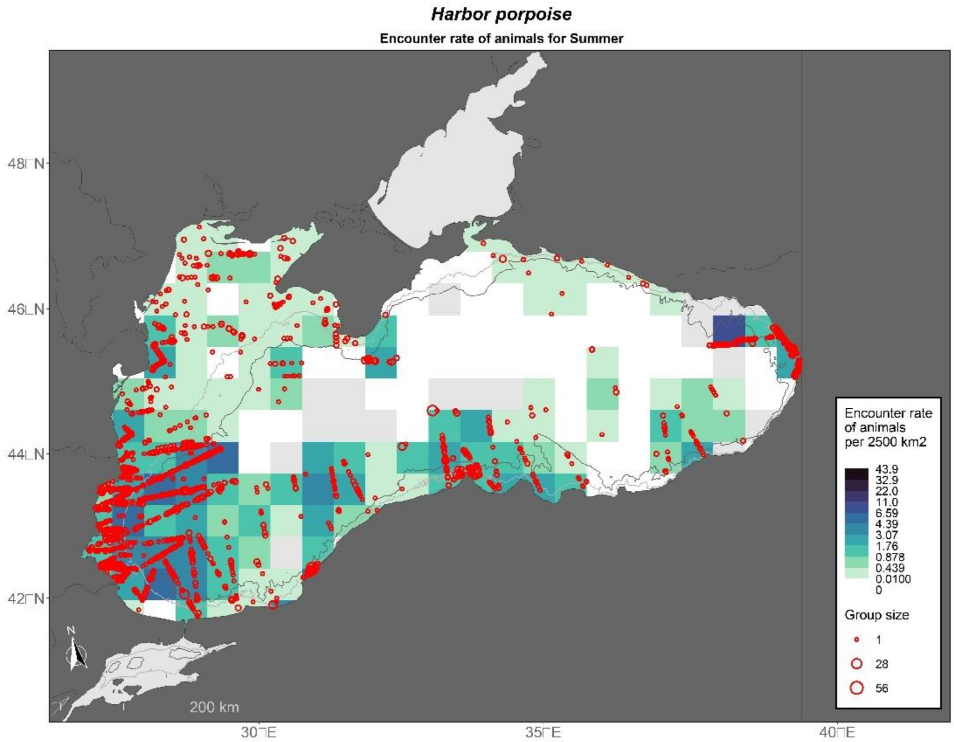

Figure B-29. Map of encounter rates of harbor porpoise in summer, with observations.

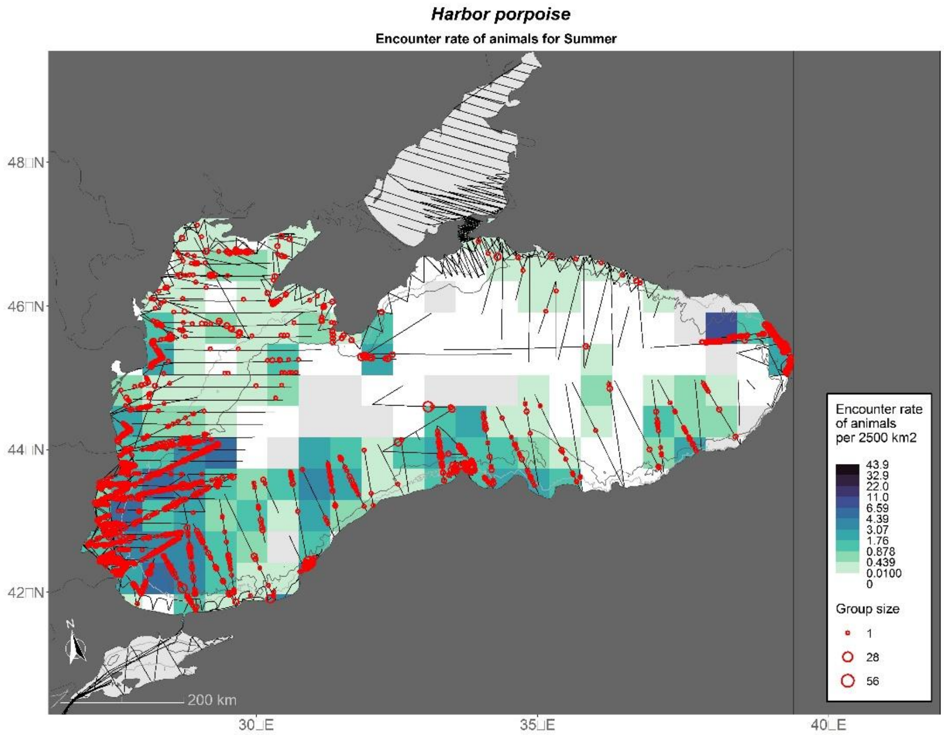

Figure B-30. Map of encounter rates of harbor porpoise in summer, with observations and tracks.

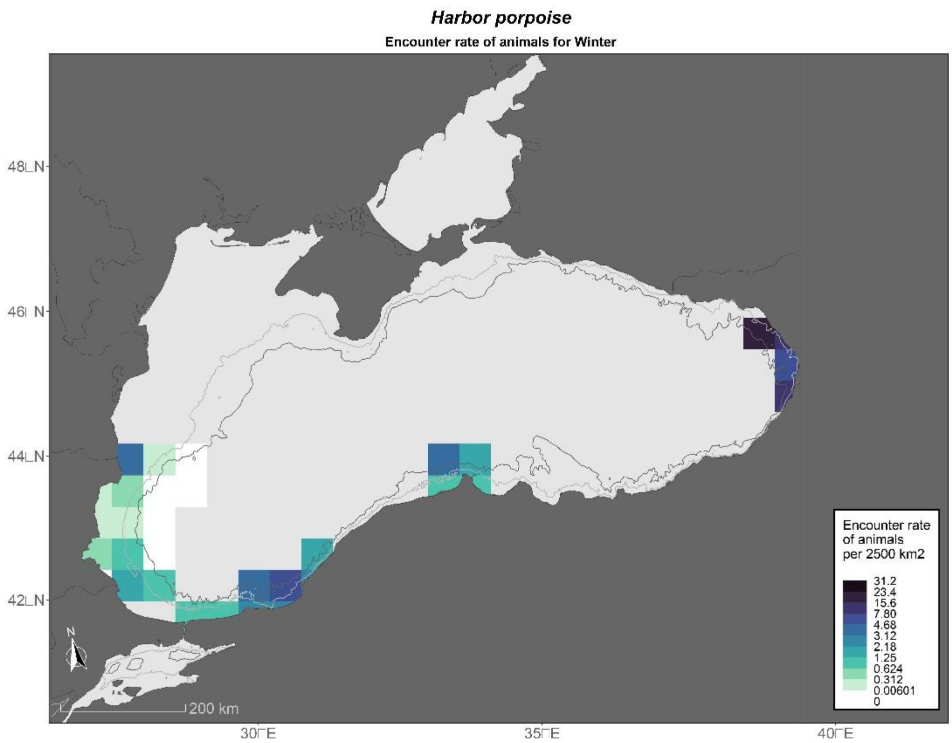

Figure B-31. Map of encounter rates of harbor porpoise in winter.

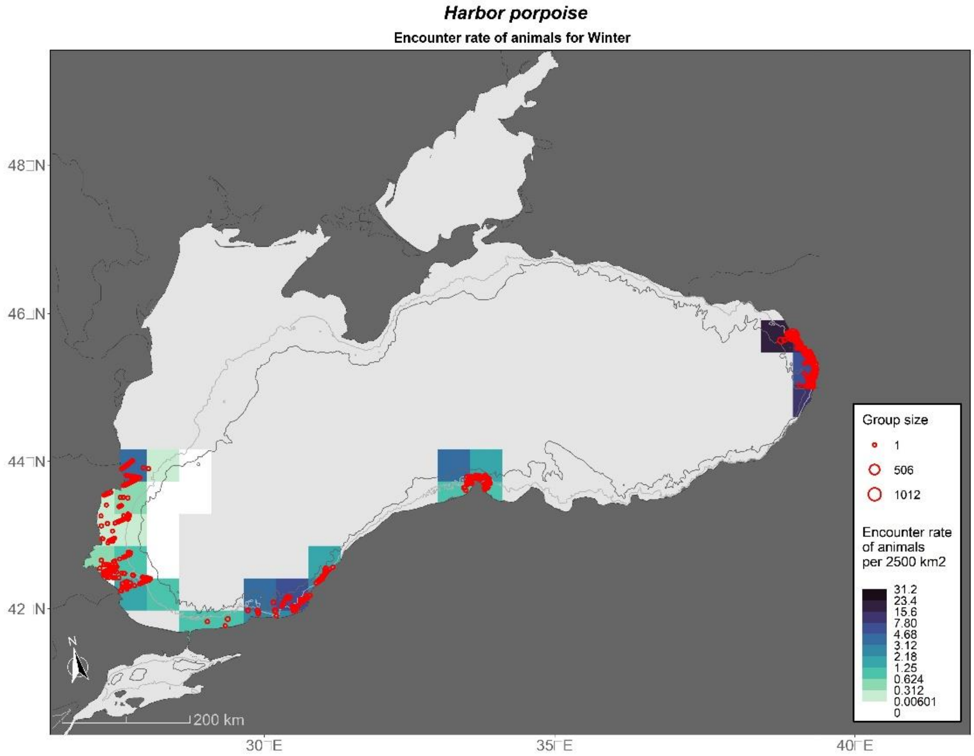

Figure B-32. Map of encounter rates of harbor porpoise in winter, with observations.

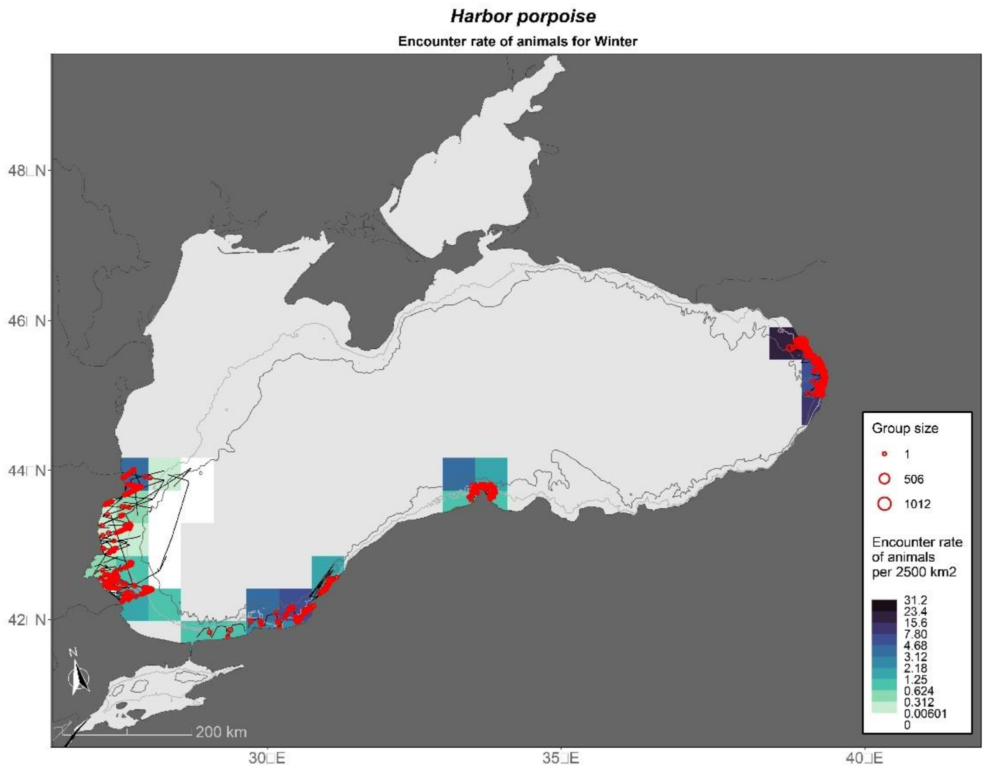

Figure B-33. Map of encounter rates of harbor porpoise in winter, with observations and tracks.

4. Maps of encounter rates for the Mediterranean Sea

4.1. Fin whale

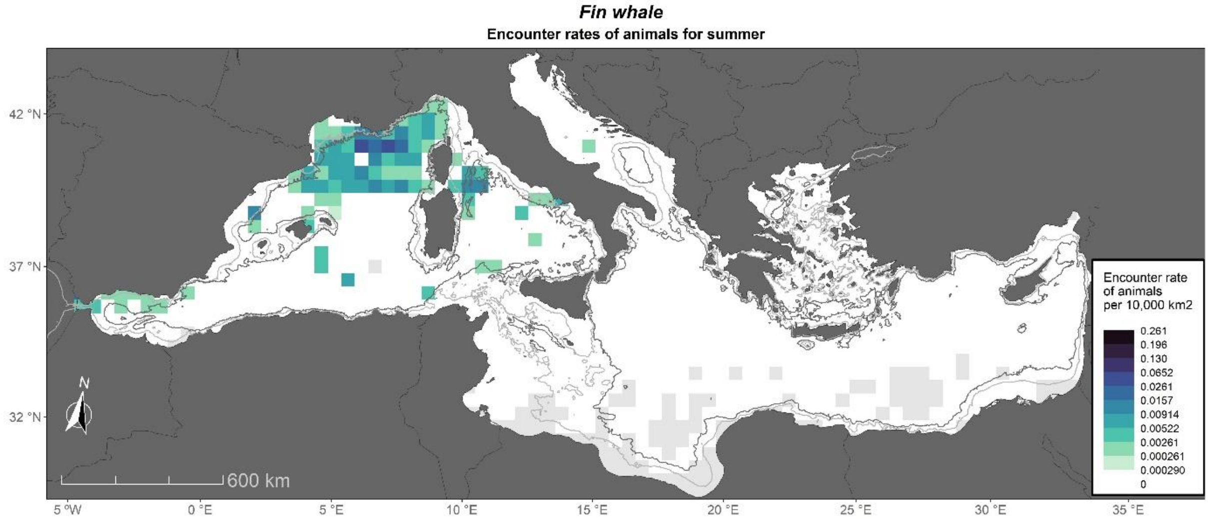

Figure B-34. Map of encounter rates of fin whale in summer.

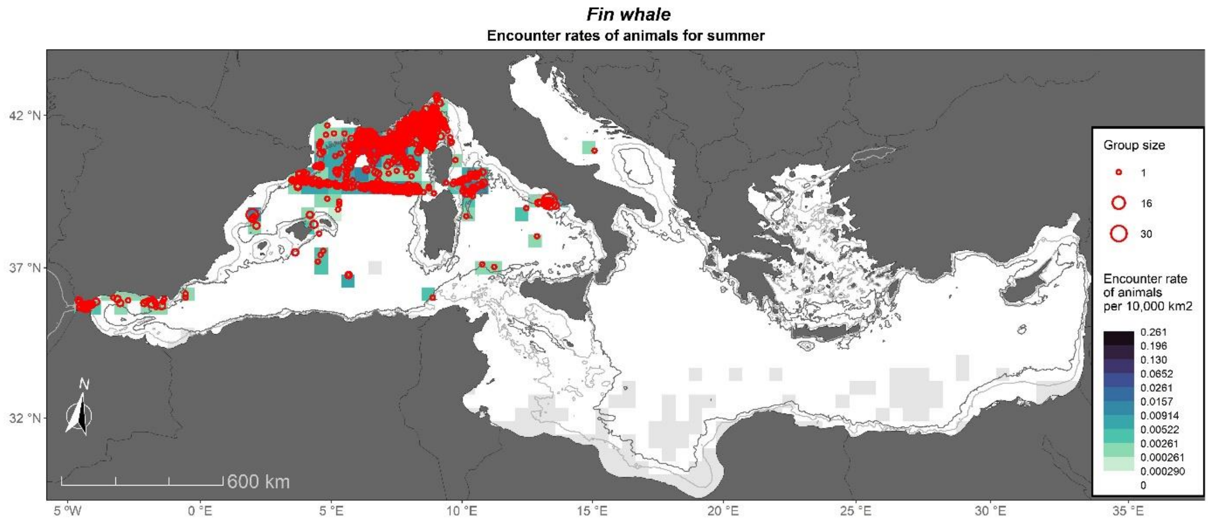

Figure B-35. Map of encounter rates of fin whale in summer, with observations.

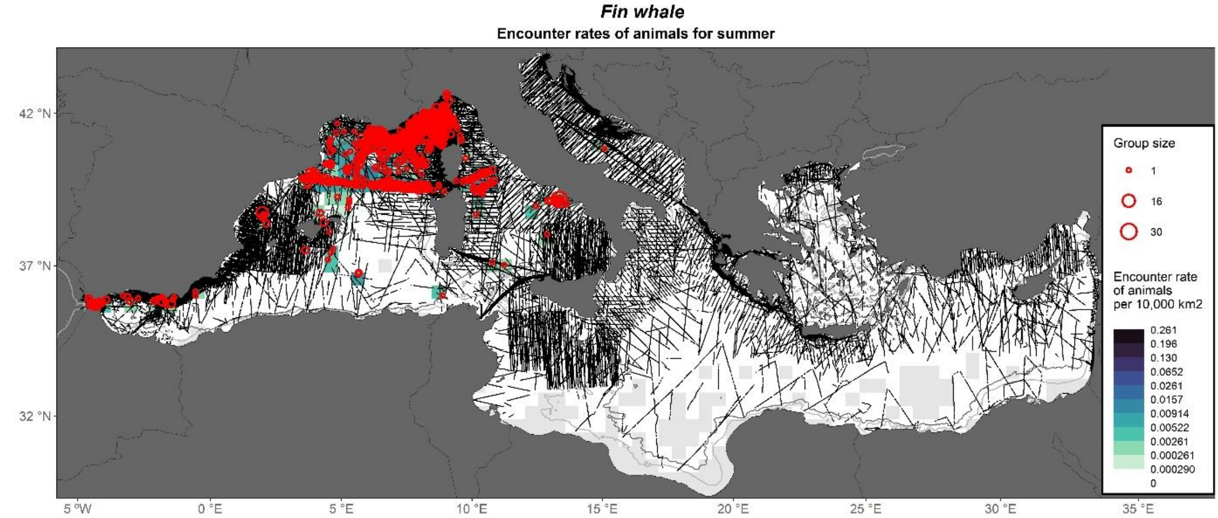

Figure B-36. Map of encounter rates of fin whale in summer, with observations and tracks.

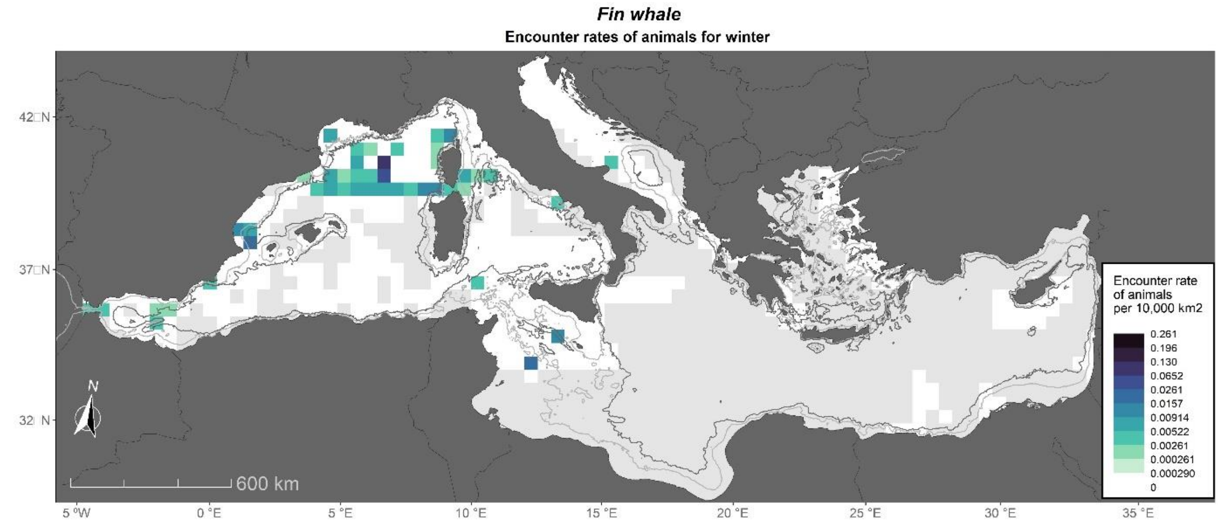

Figure B-37. Map of encounter rates of fin whale in winter.

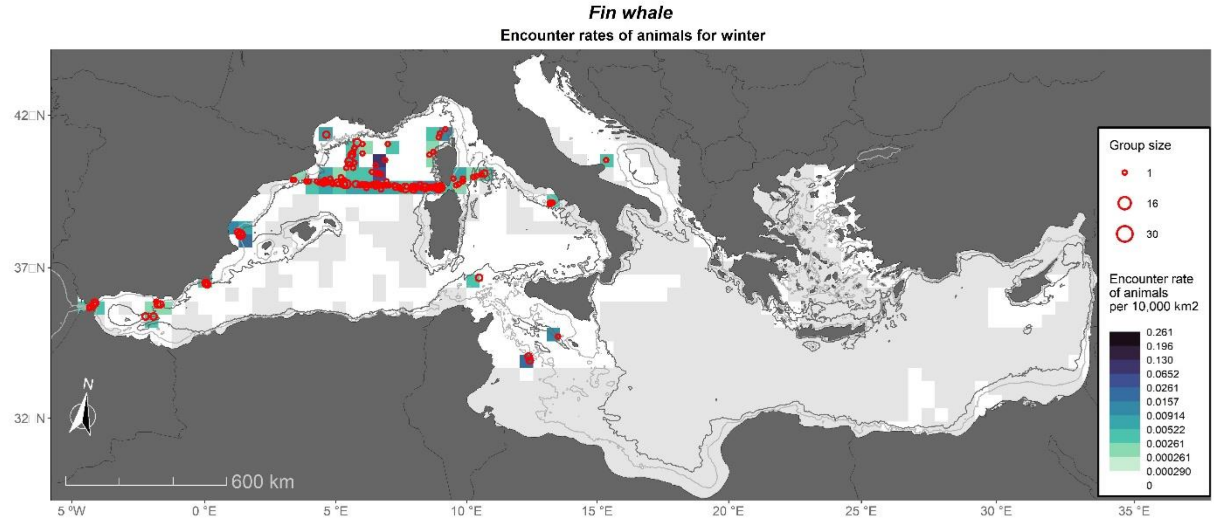

Figure B-38. Map of encounter rates of fin whale in winter, with observations.

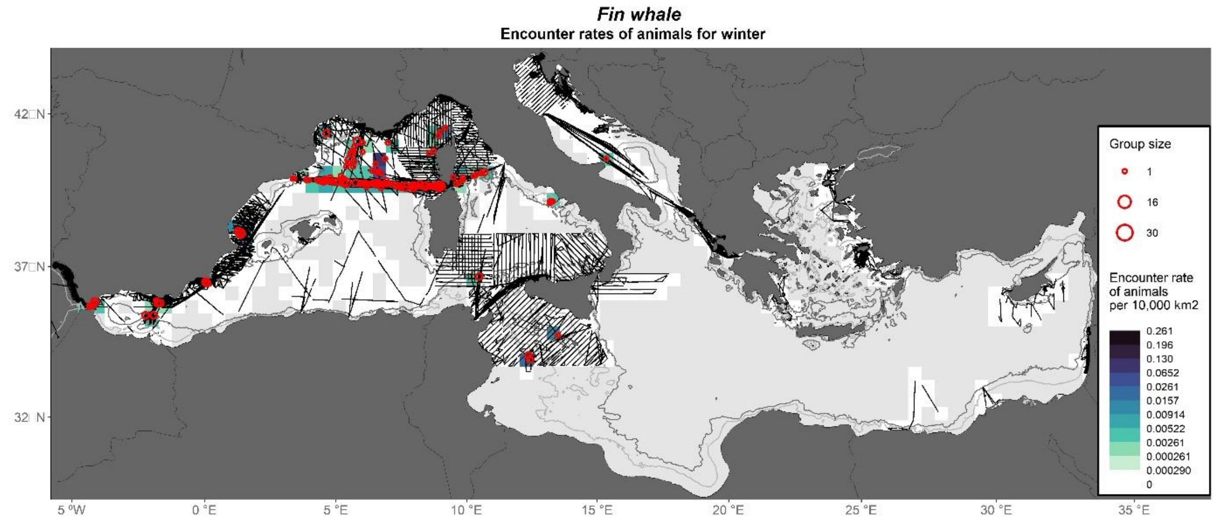

Figure B-39. Map of encounter rates of fin whale in winter, with observations and tracks.

4.2. Sperm whale

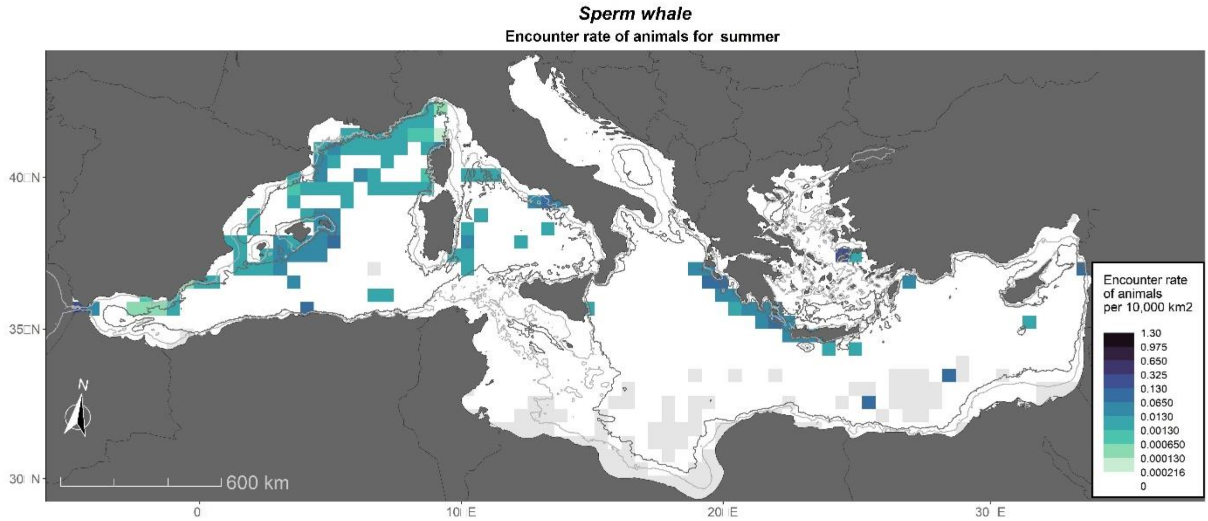

Figure B-40. Map of encounter rates of sperm whale in summer.

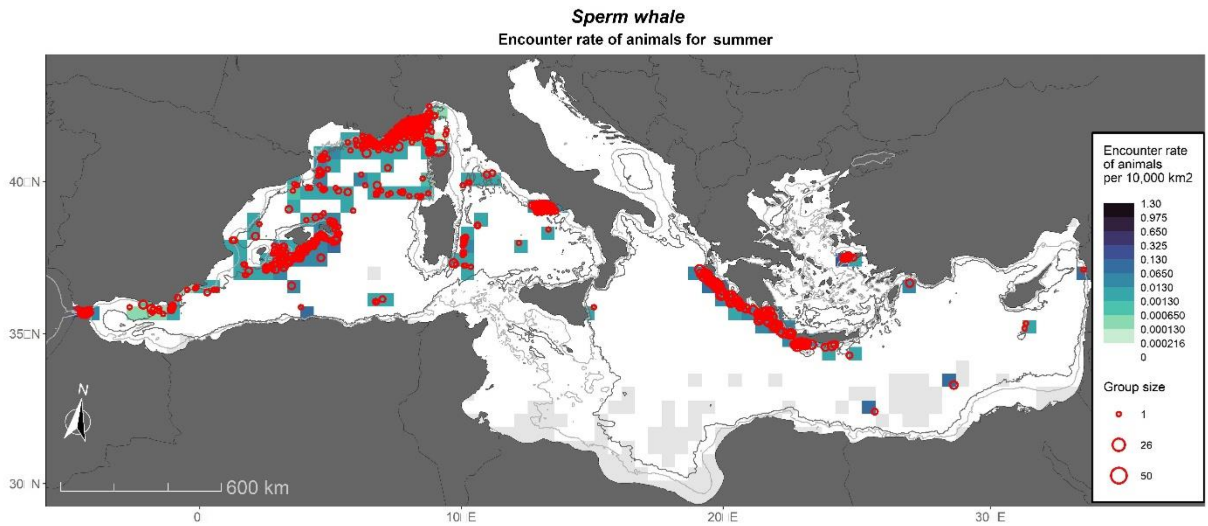

Figure B-41. Map of encounter rates of sperm whale in summer, with observations.

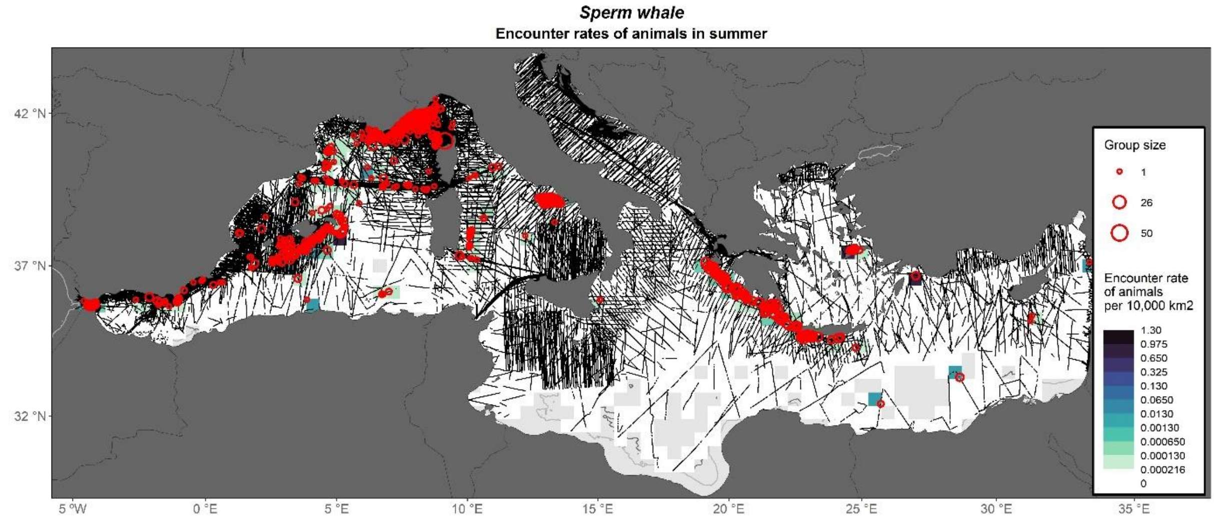

Figure B-42. Map of encounter rates of sperm whale in summer, with observations and tracks.

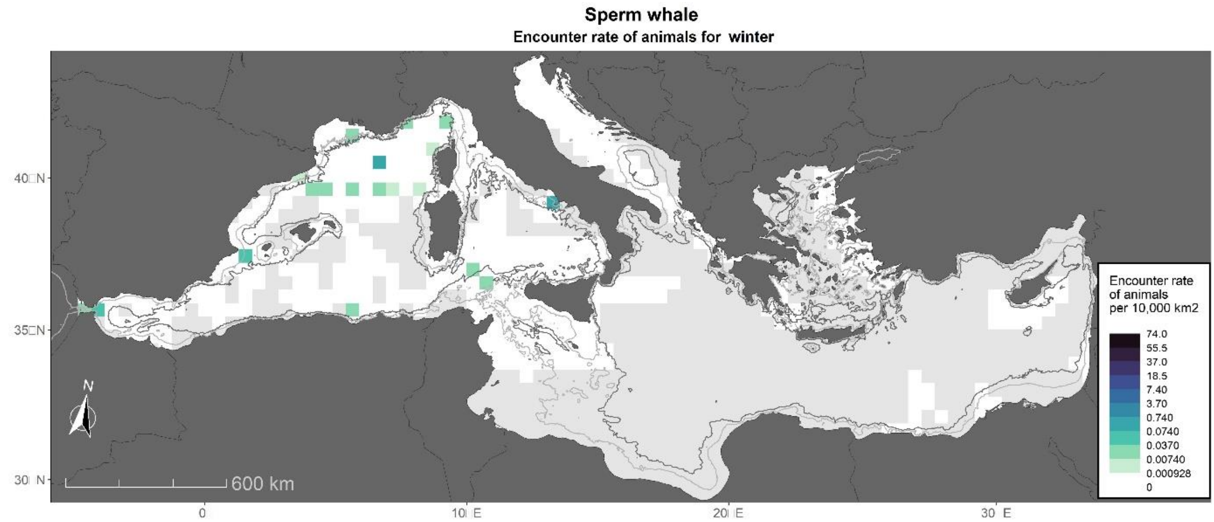

Figure B-43. Map of encounter rates of sperm whale in winter.

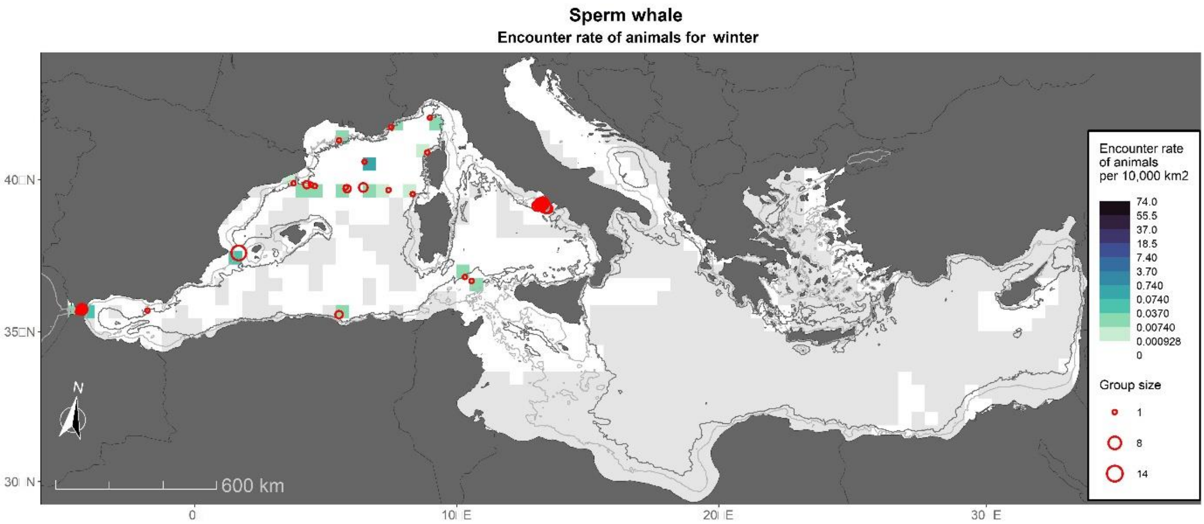

Figure B-44. Map of encounter rates of sperm whale in winter, with observations.

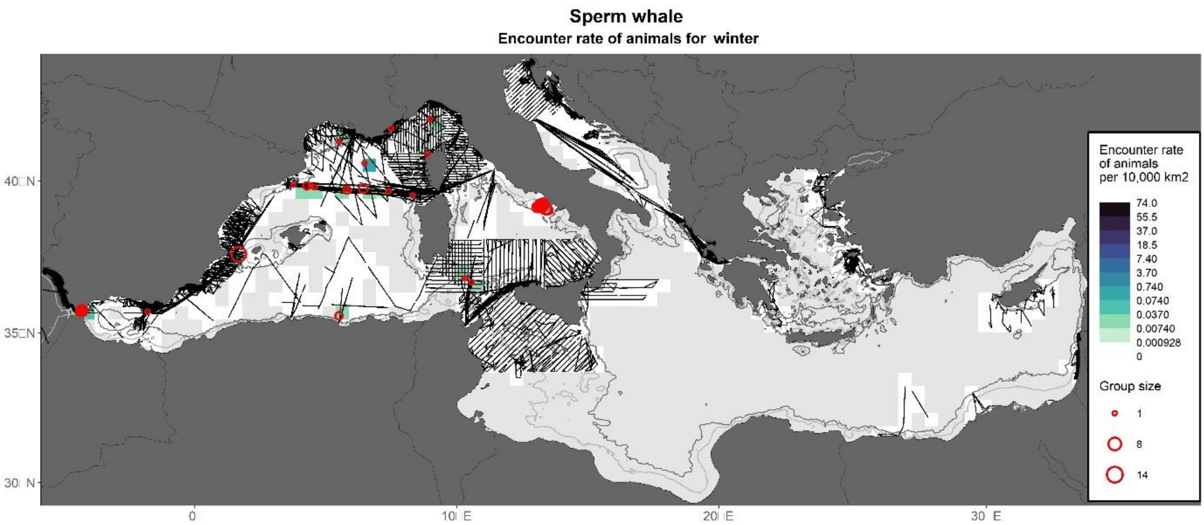

Figure B-45. Map of encounter rates of sperm whale in winter, with observations and tracks.

4.3. Risso's dolphin

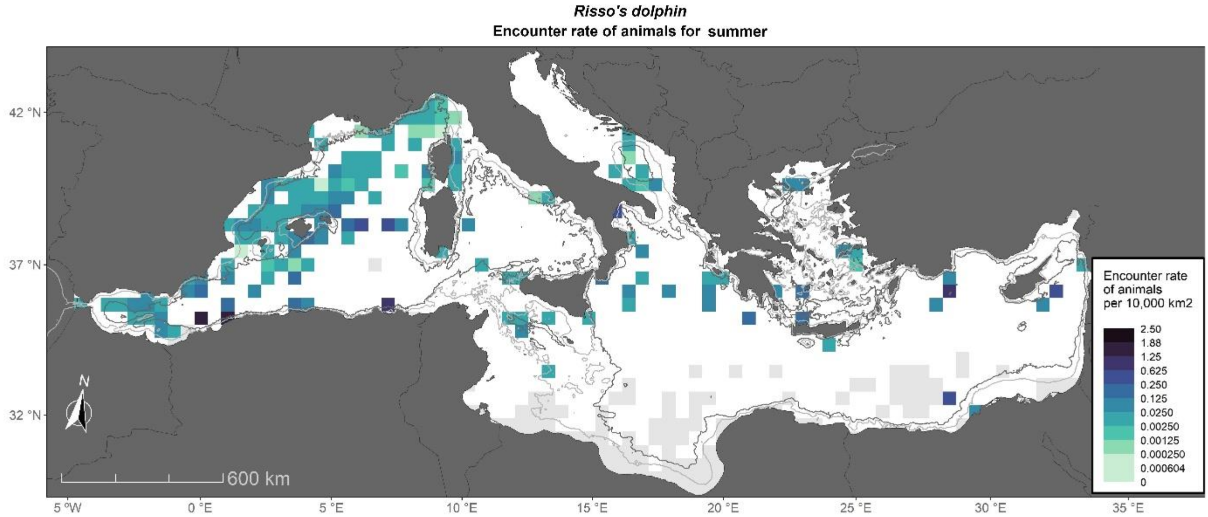

Figure B-46. Map of encounter rates of Risso's dolphin in summer.

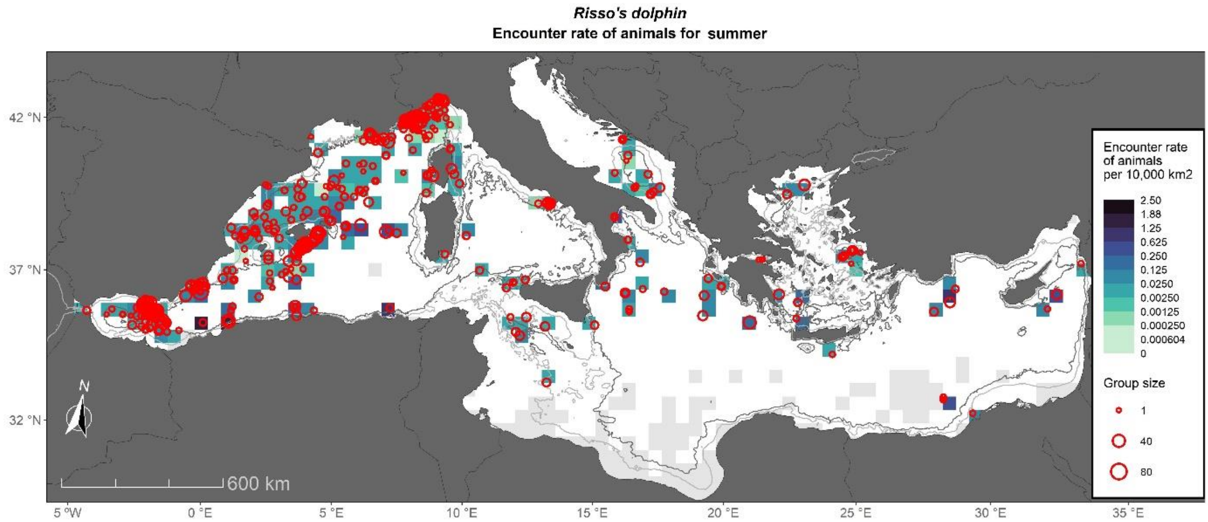

Figure B-47. Map of encounter rates of Risso's dolphin in summer, with observations.

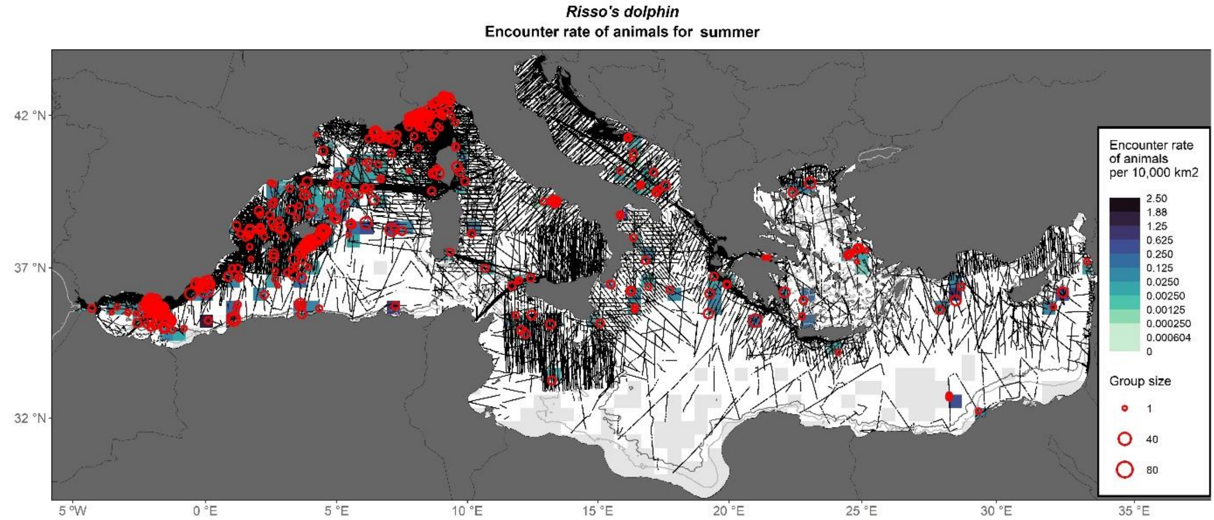

Figure B-48. Map of encounter rates of Risso's dolphin in summer, with observations and tracks.

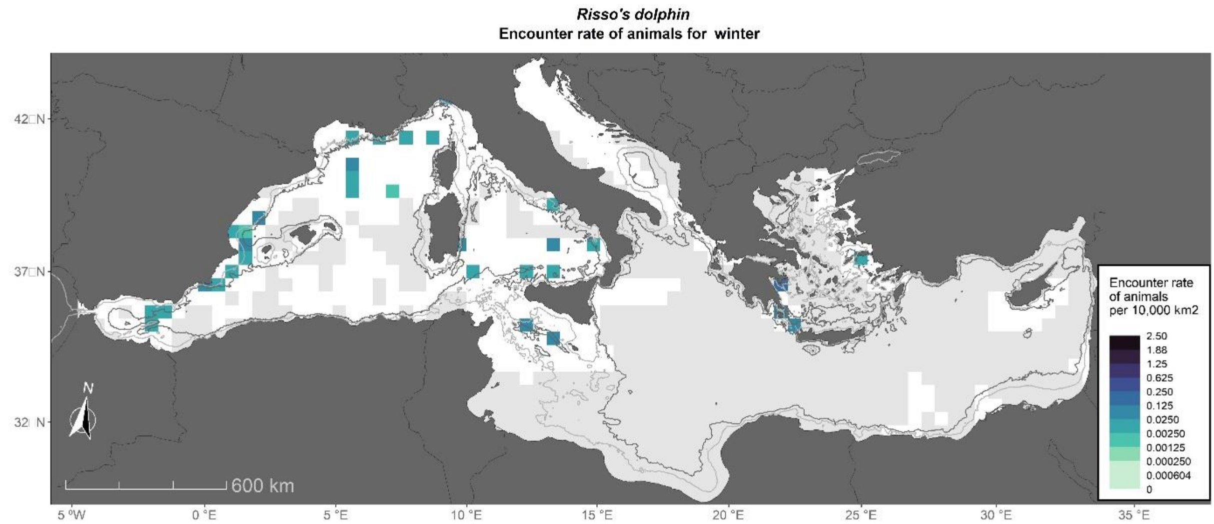

Figure B-49. Map of encounter rates of Risso's dolphin in winter.

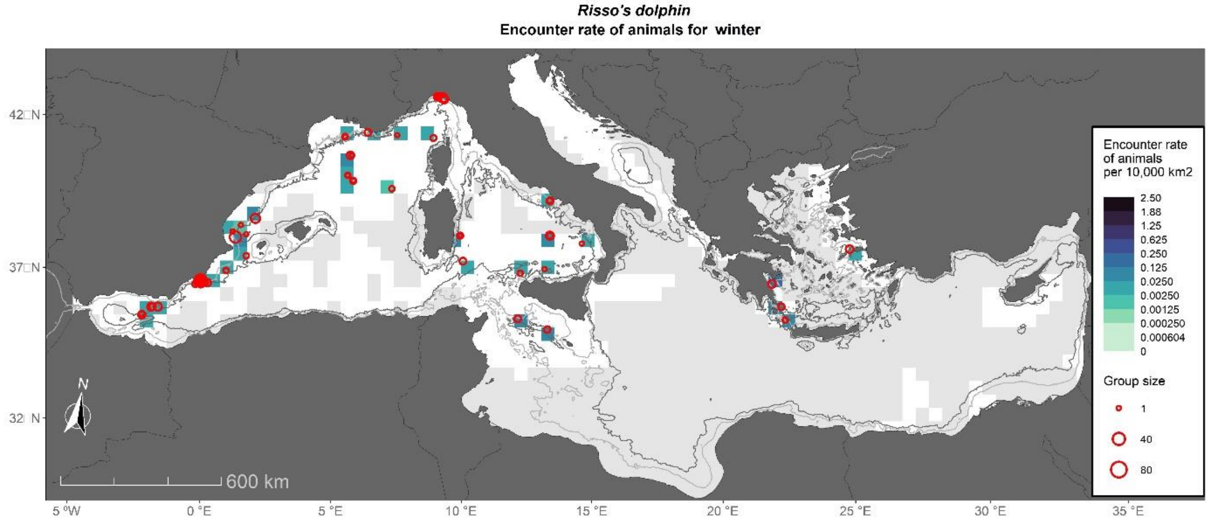

Figure B-50. Map of encounter rates of Risso's dolphin in winter, with observations.

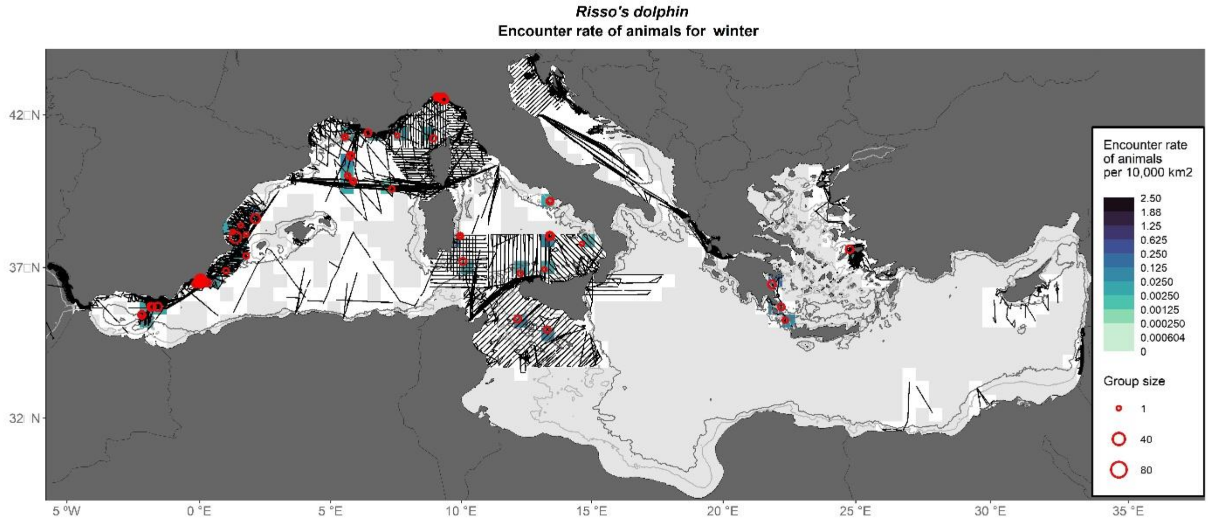

Figure B-51. Map of encounter rates of Risso's dolphin in winter, with observations and tracks.

4.4. Long-finned pilot whale

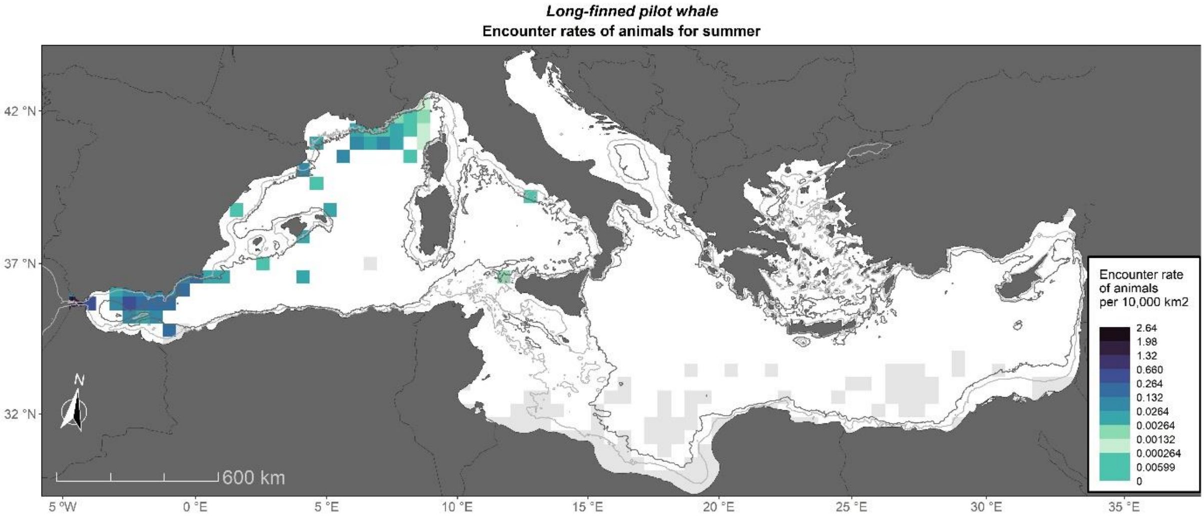

Figure B-52. Map of encounter rates of long-finned pilot whale in summer.

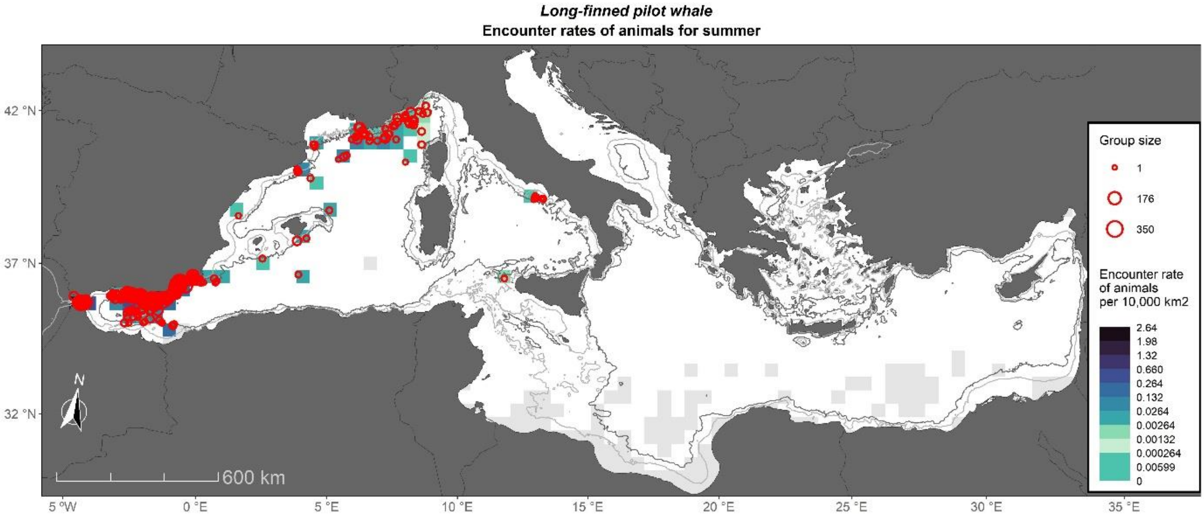

Figure B-53. Map of encounter rates of long-finned pilot whale in summer, with observations.

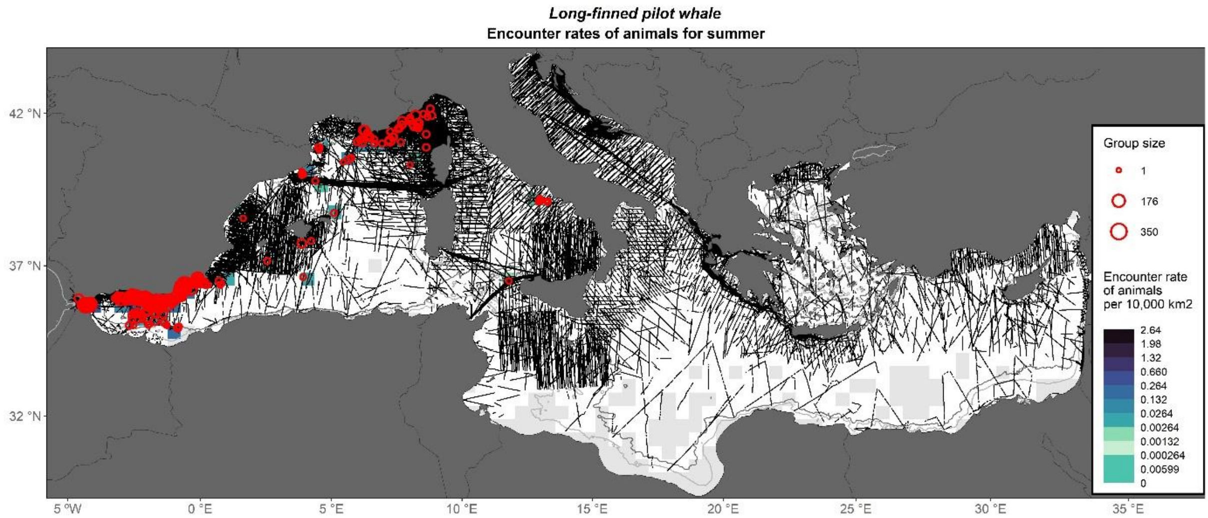

Figure B-54. Map of encounter rates of long-finned pilot whale in summer, with observations and tracks.

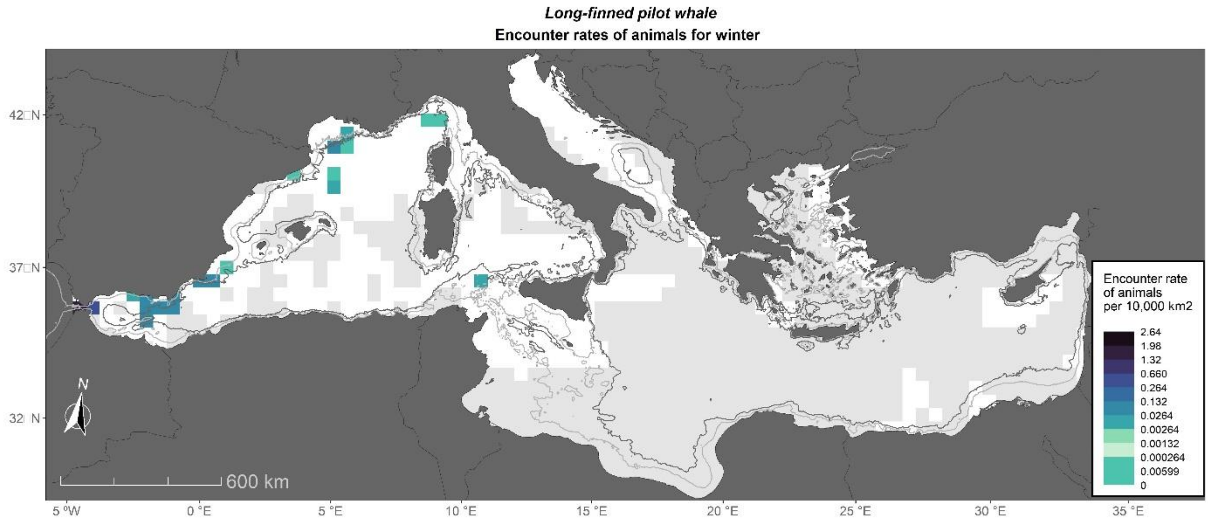

Figure B-55. Map of encounter rates of long-finned pilot whale in winter.

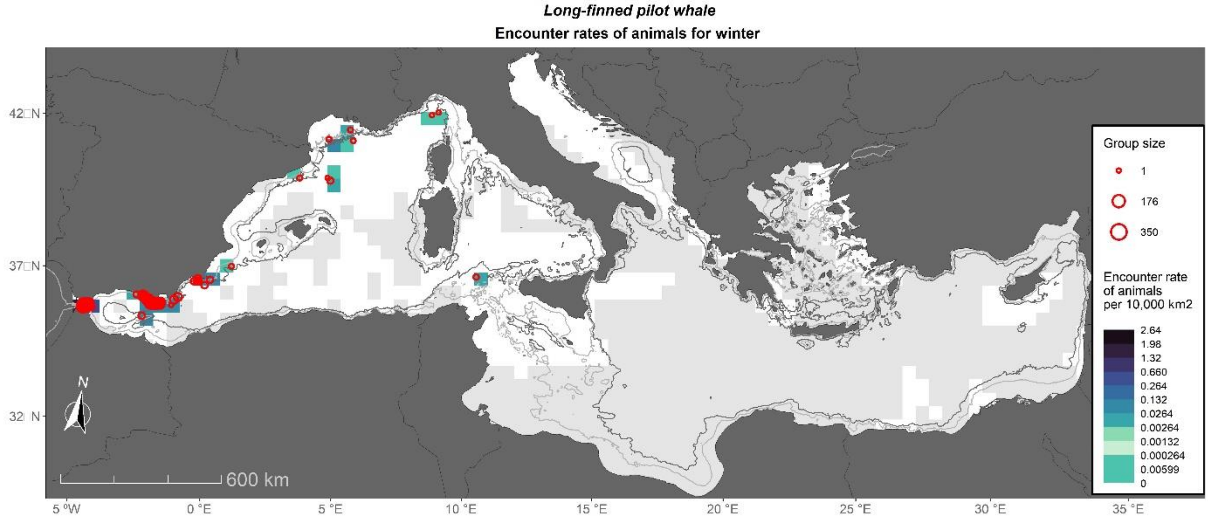

Figure B-56. Map of encounter rates of long-finned pilot whale in winter, with observations.

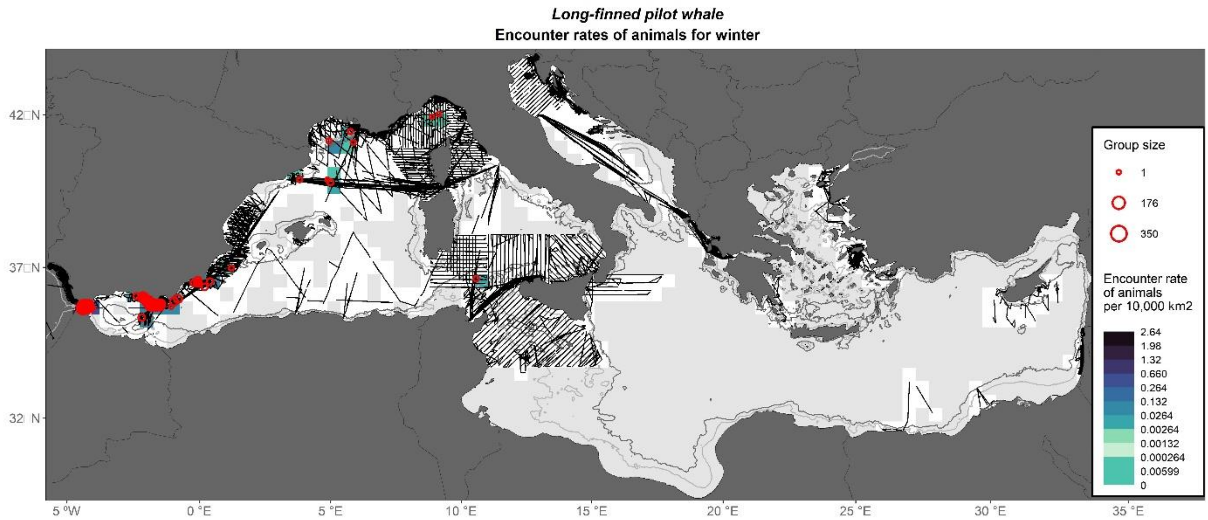

Figure B-57. Map of encounter rates of long-finned pilot whale in winter, with observations and tracks.

4.5. Cuvier's beaked whales

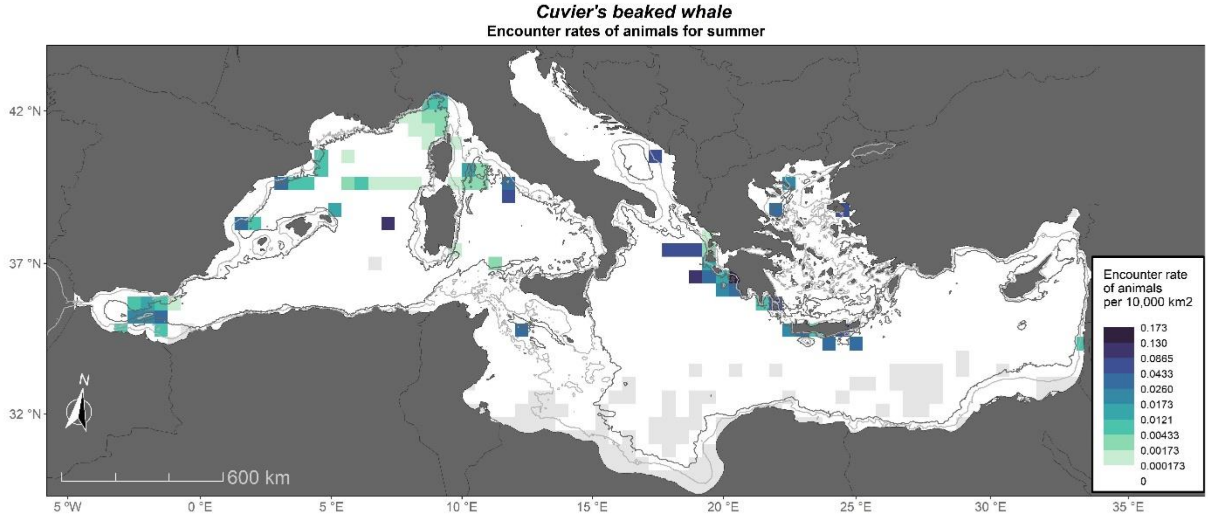

Figure B-58. Map of encounter rates of Cuvier's beaked whales in summer.

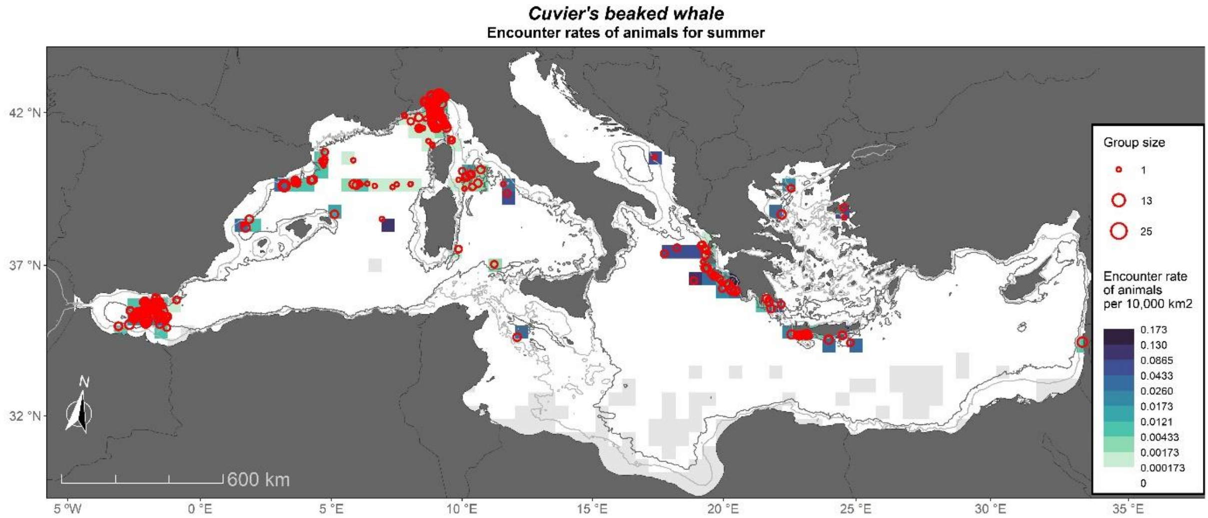

Figure B-59. Map of encounter rates of Cuvier's beaked whales in summer, with observations.

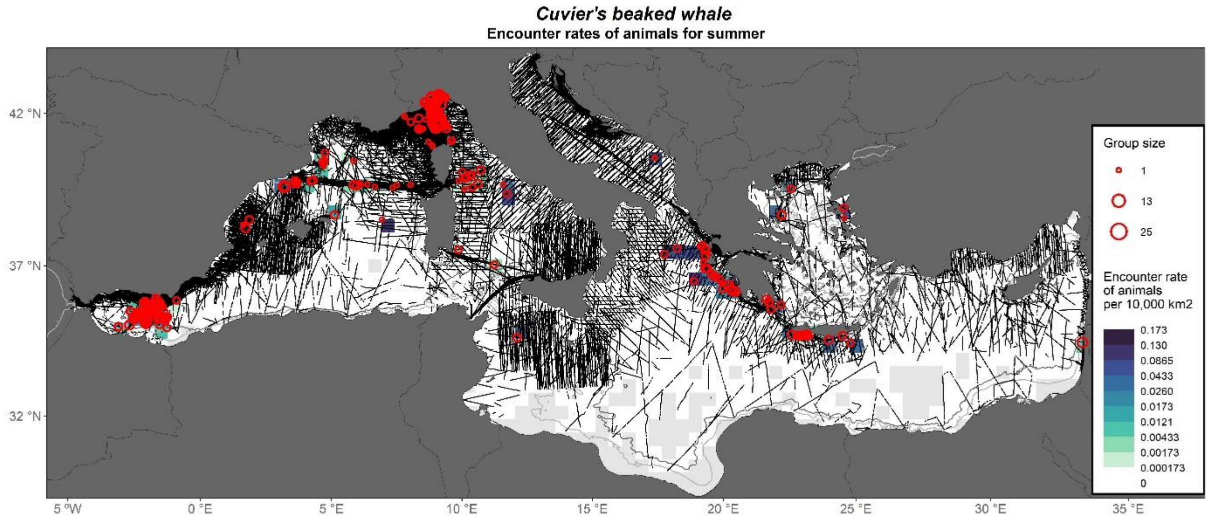

Figure B-60. Map of encounter rates of Cuvier's beaked whales in summer, with observations and tracks.

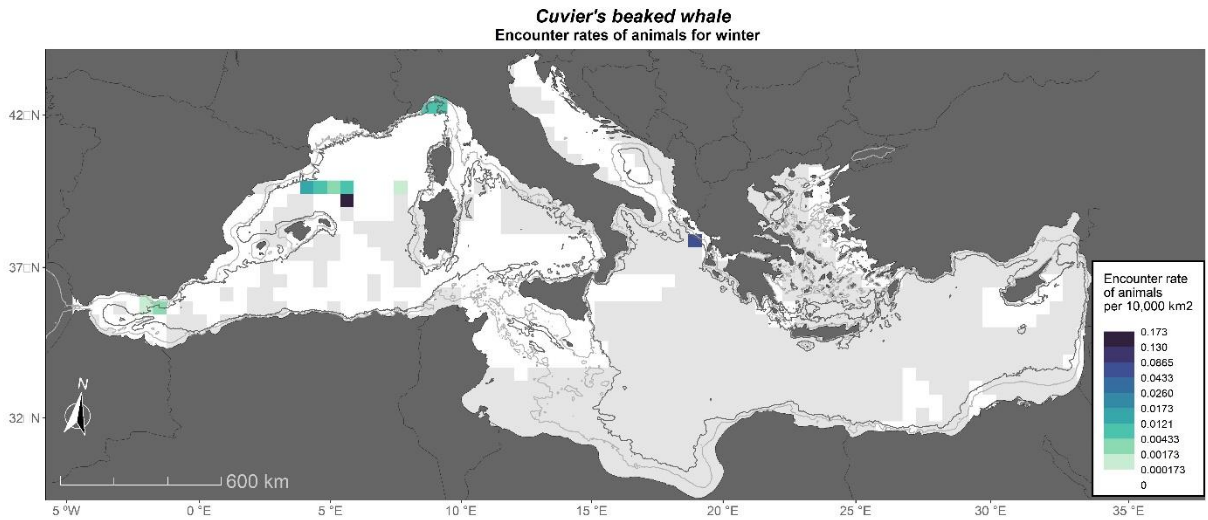

Figure B-61. Map of encounter rates of Cuvier's beaked whales in winter.

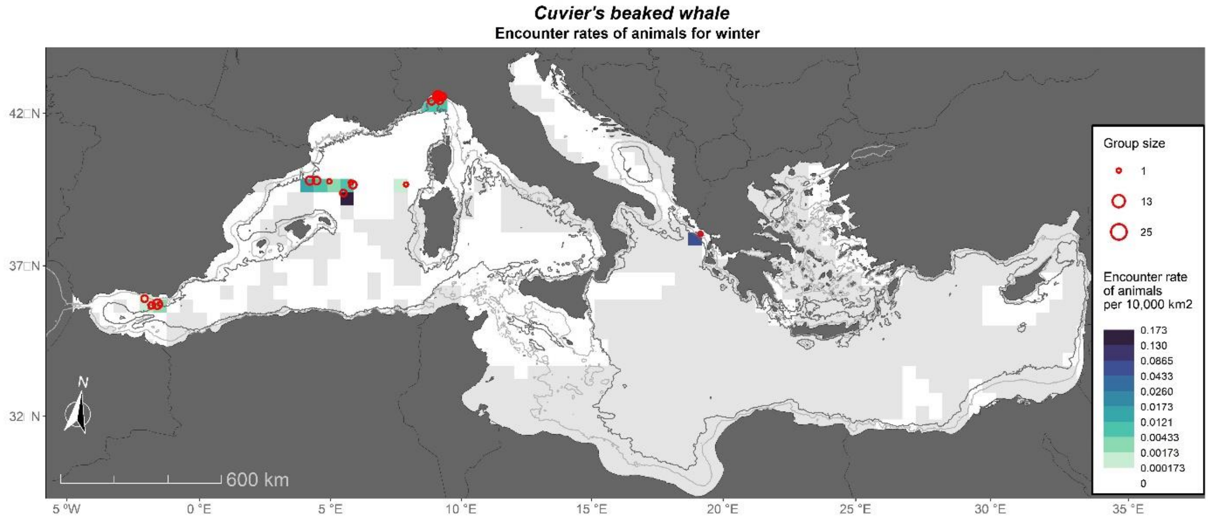

Figure B-62. Map of encounter rates of Cuvier's beaked whales in winter, with observations.

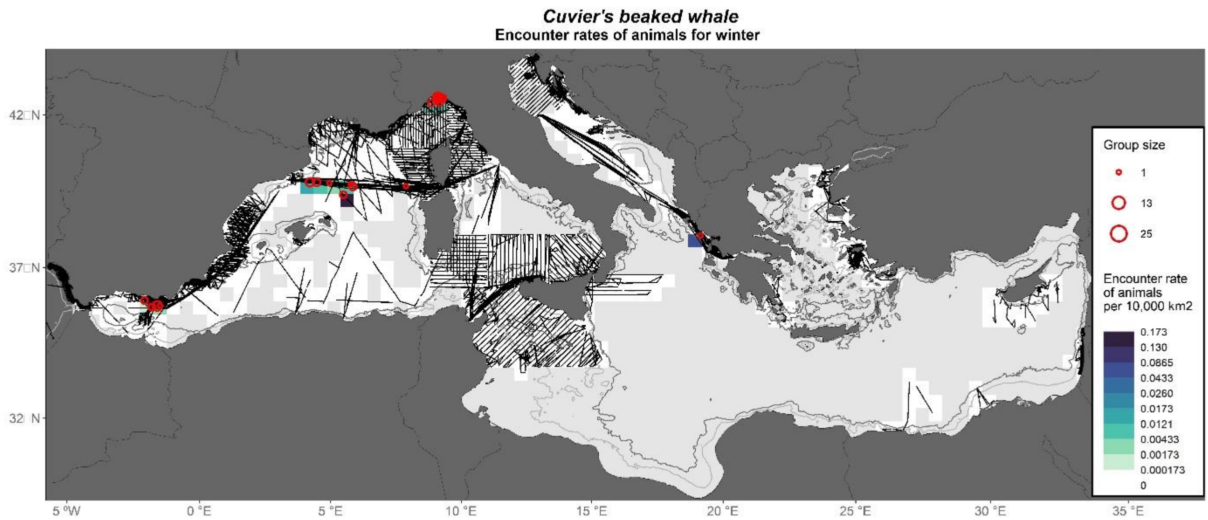

Figure B-63. Map of encounter rates of Cuvier's beaked whales in winter, with observations and tracks.

4.6. Bottlenose dolphin

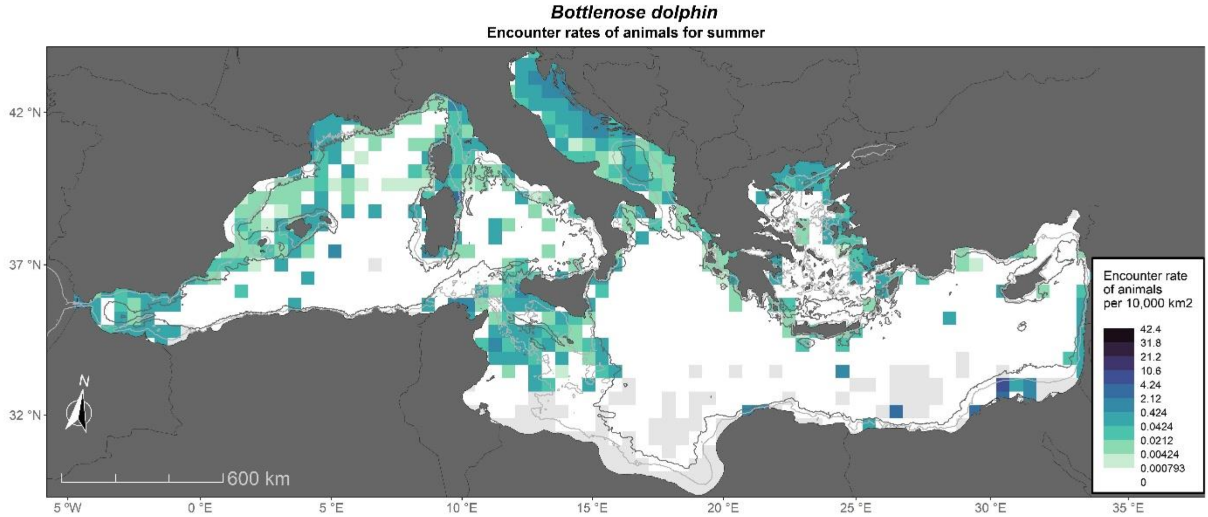

Figure B-64. Map of encounter rates of bottlenose dolphin in summer.

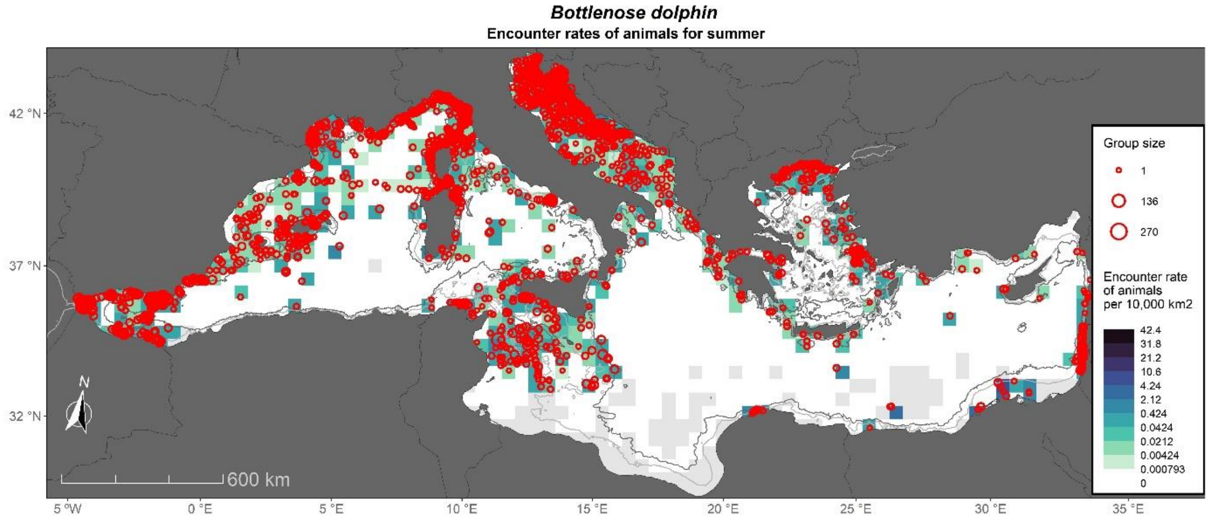

Figure B-65. Map of encounter rates of bottlenose dolphin in summer, with observations.

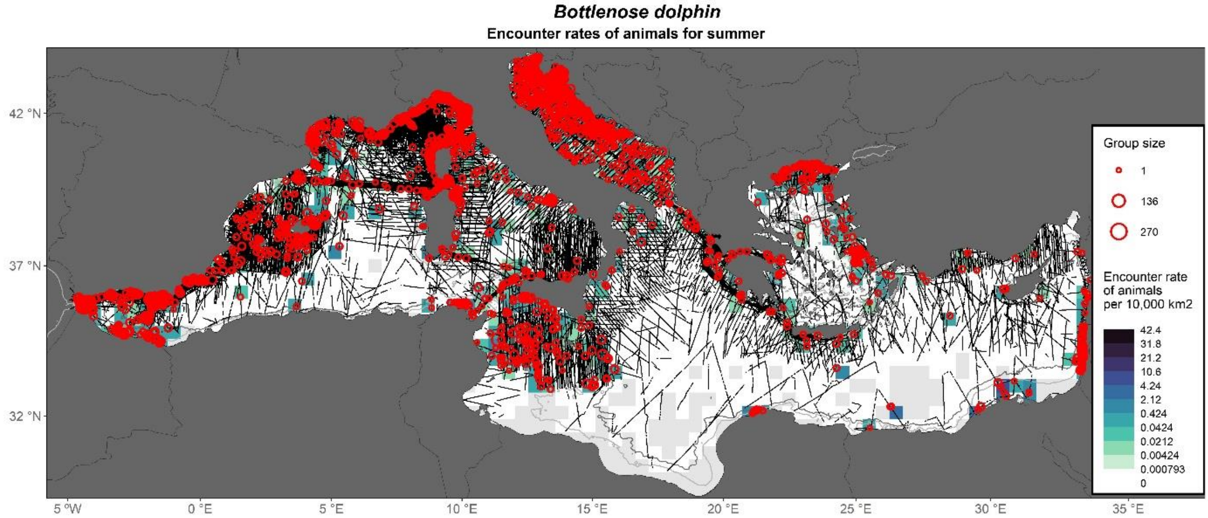

Figure B-66. Map of encounter rates of bottlenose dolphin in summer, with observations and tracks.

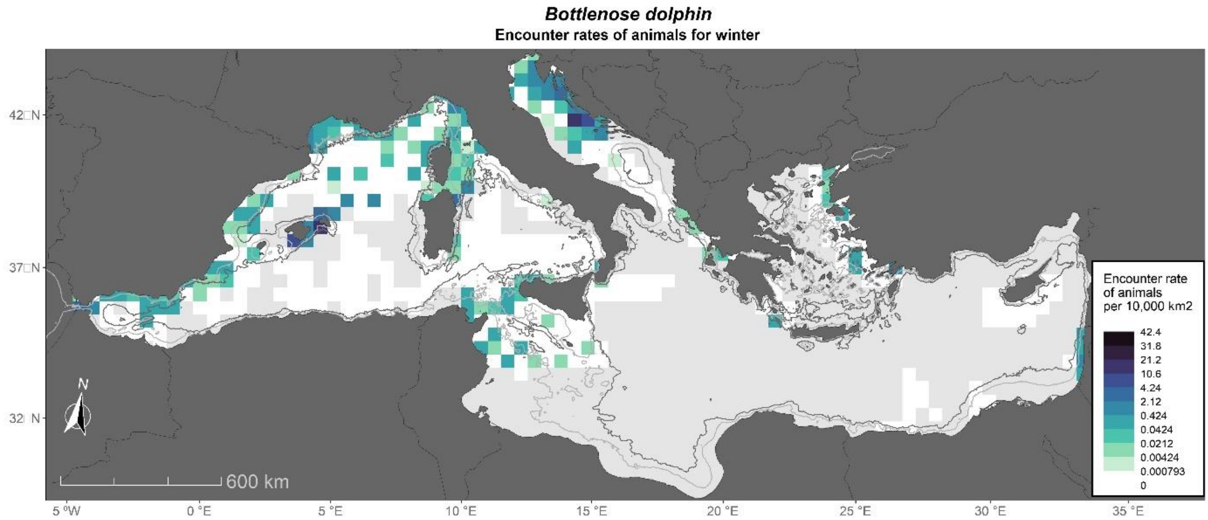

Figure B-67. Map of encounter rates of bottlenose dolphin in winter.

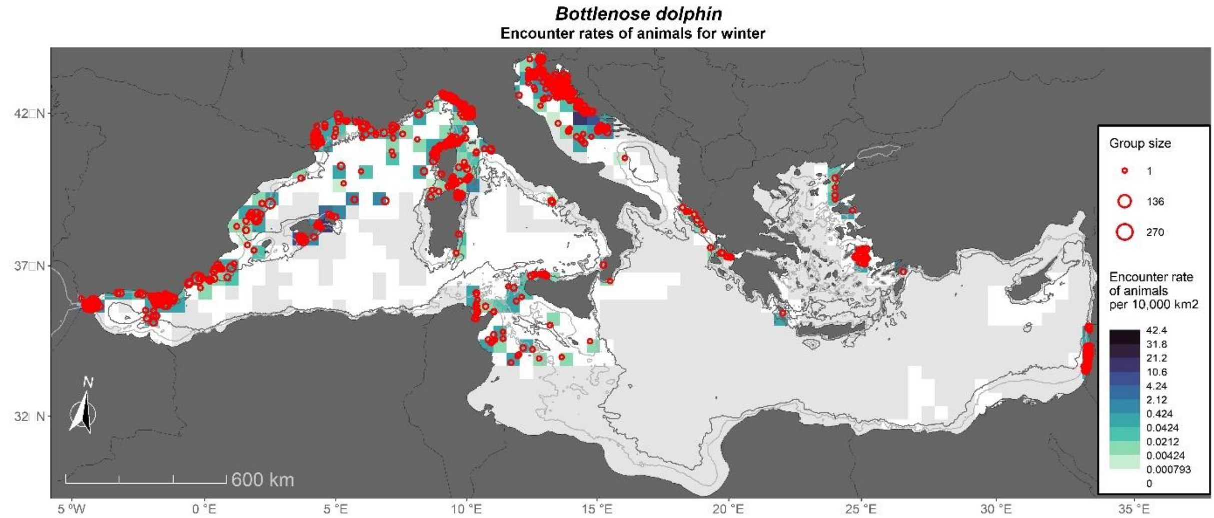

Figure B-68. Map of encounter rates of bottlenose dolphin in winter, with observations.

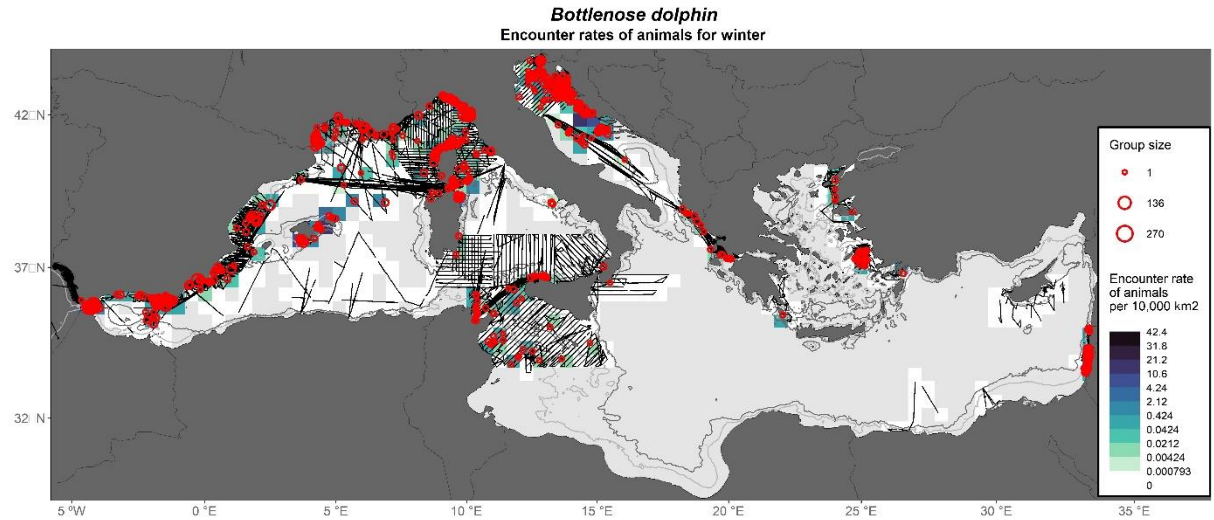

Figure B-69. Map of encounter rates of bottlenose dolphin in winter, with observations and tracks.

4.7. Common dolphin

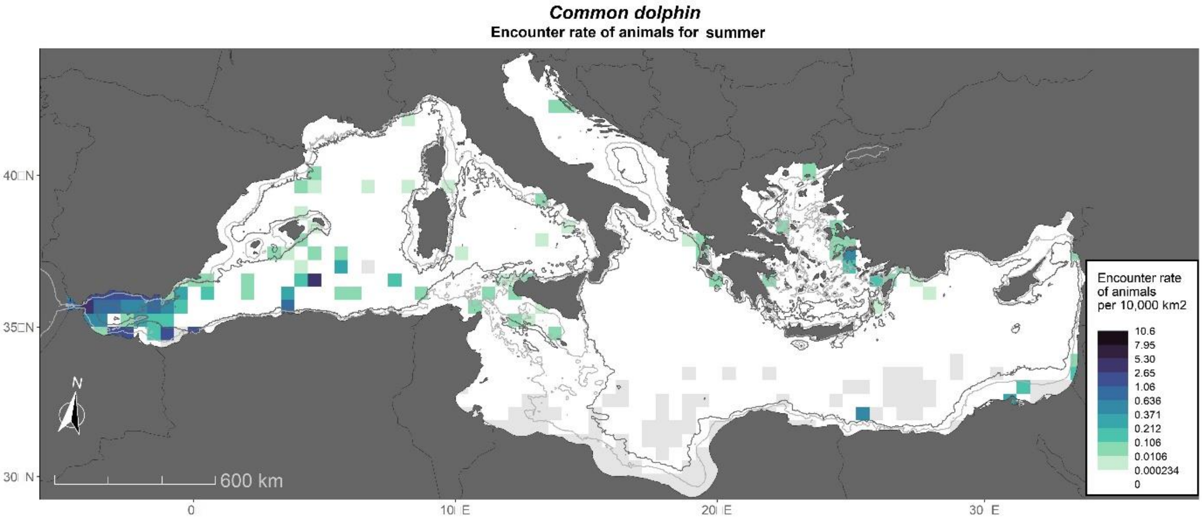

Figure B-70. Map of encounter rates of common dolphin in summer.

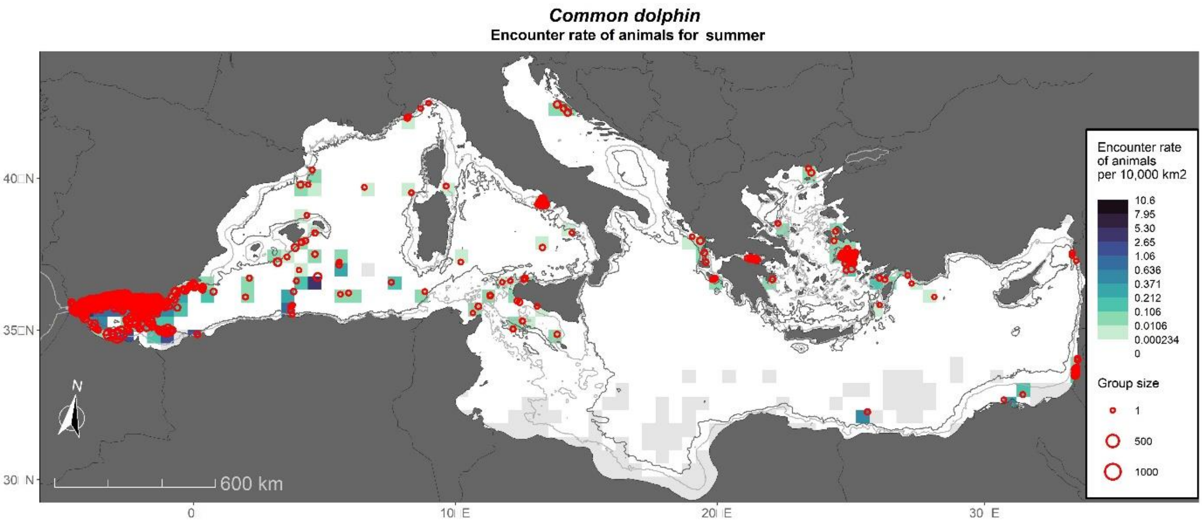

Figure B-71. Map of encounter rates of common dolphin in summer, with observations.

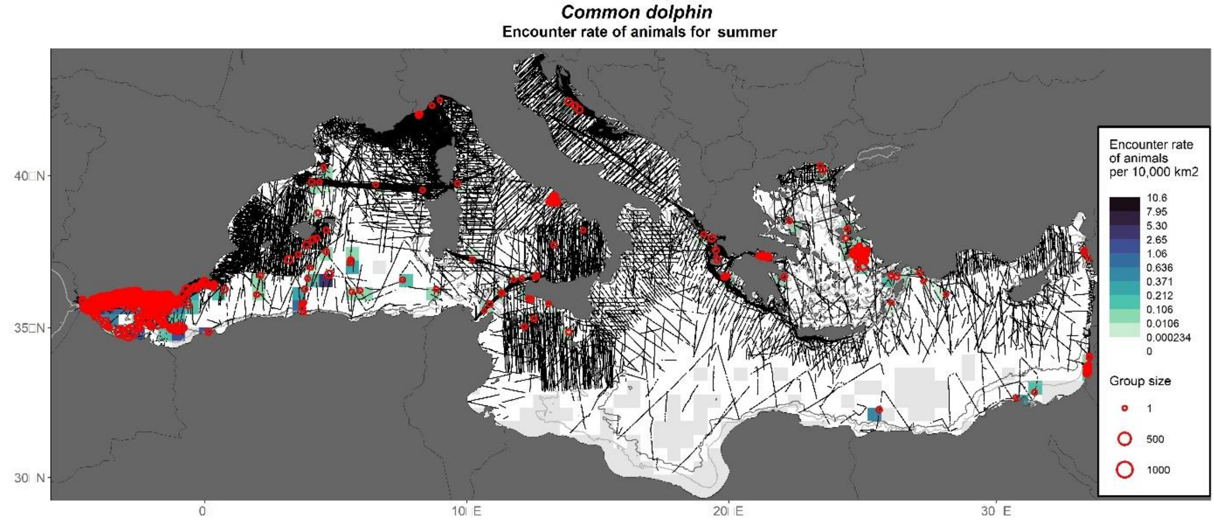

Figure B-72. Map of encounter rates of common dolphin in summer, with observations and tracks.

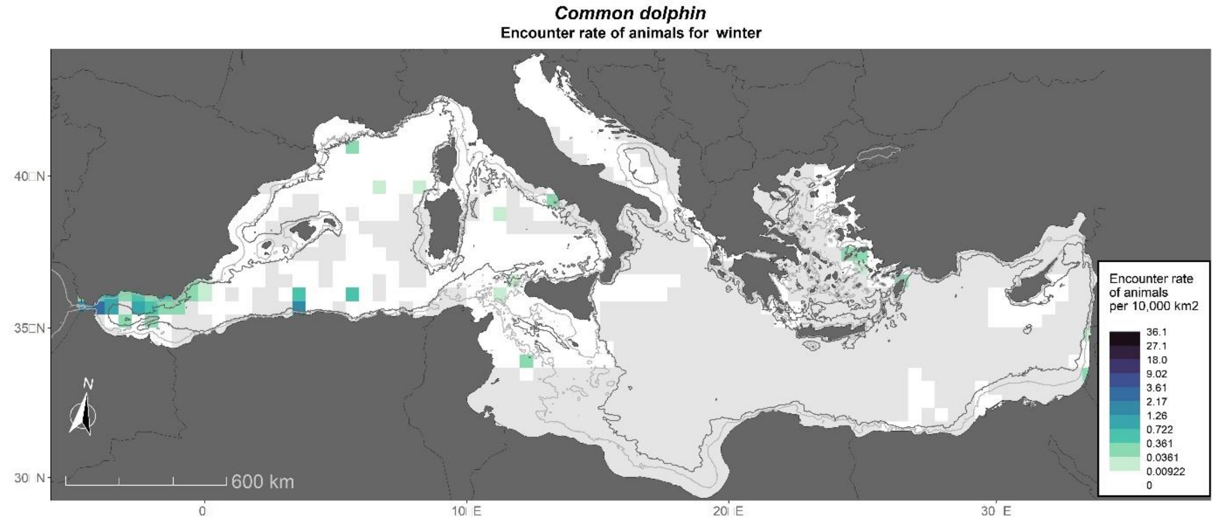

Figure B-73. Map of encounter rates of common dolphin in winter.

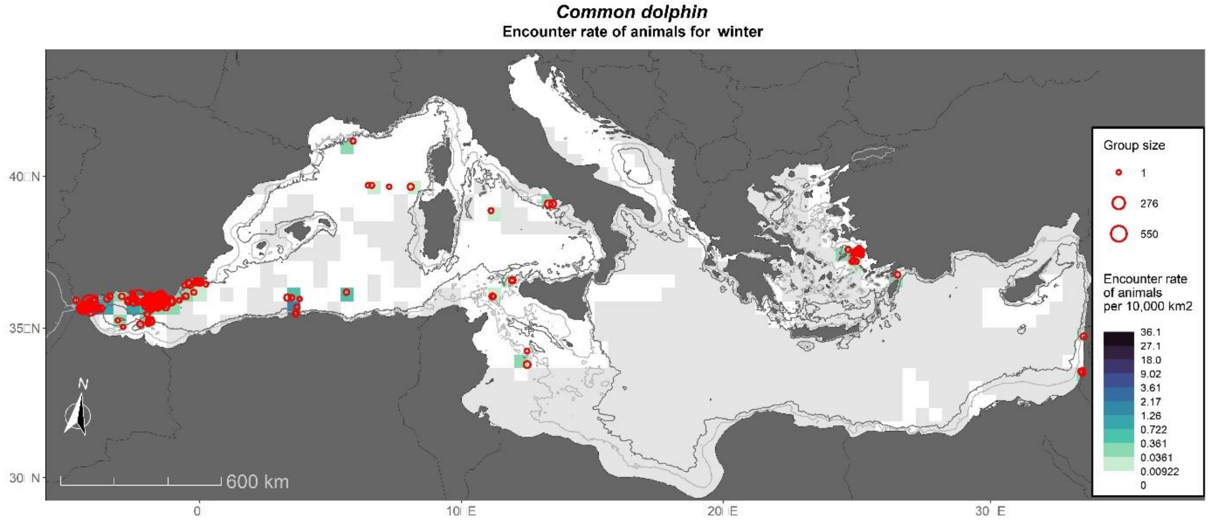

Figure B-74. Map of encounter rates of common dolphin in winter, with observations.

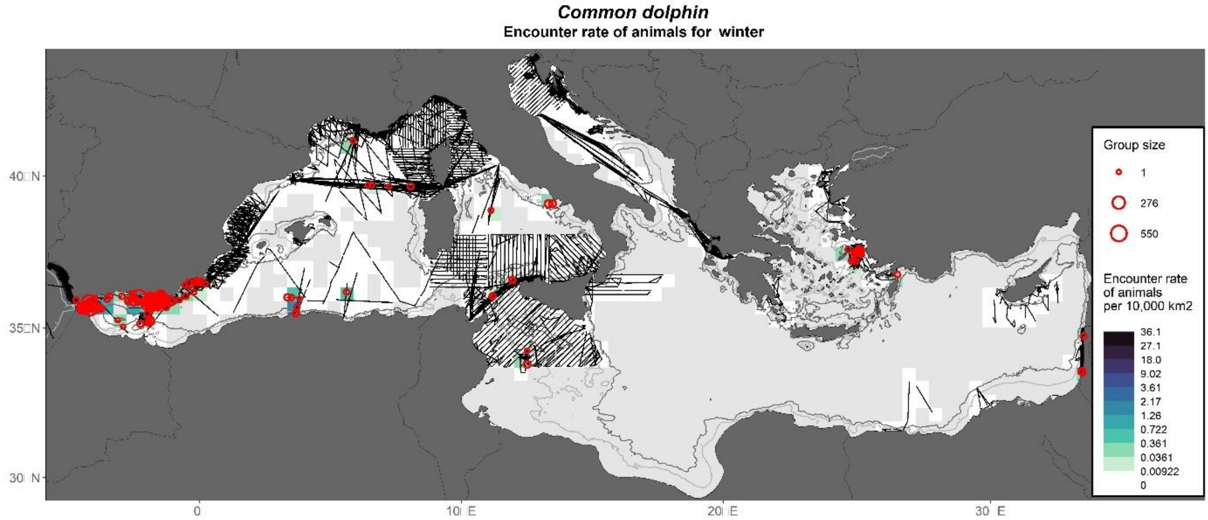

Figure B-75. Map of encounter rates of common dolphin in winter, with observations and tracks.

4.8. Striped dolphin

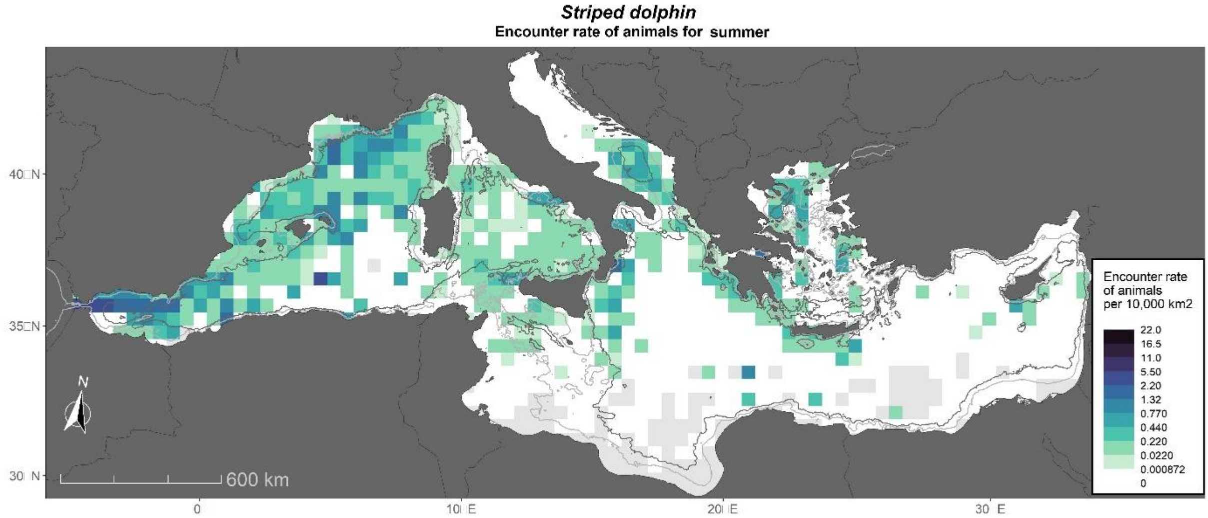

Figure B-76. Map of encounter rates of striped dolphin in summer.

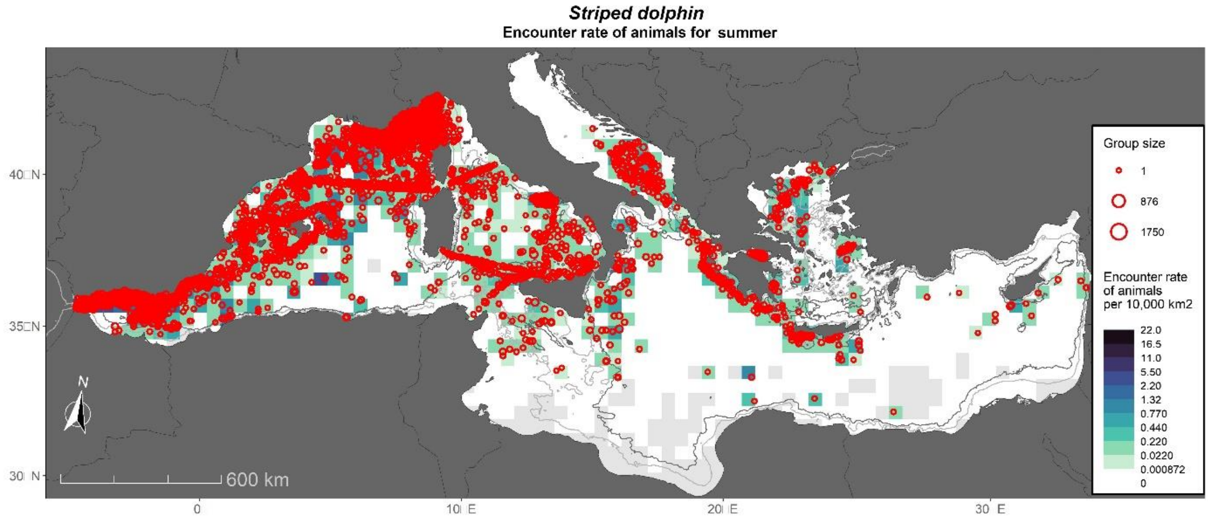

Figure B-77. Map of encounter rates of striped dolphin in summer, with observations.

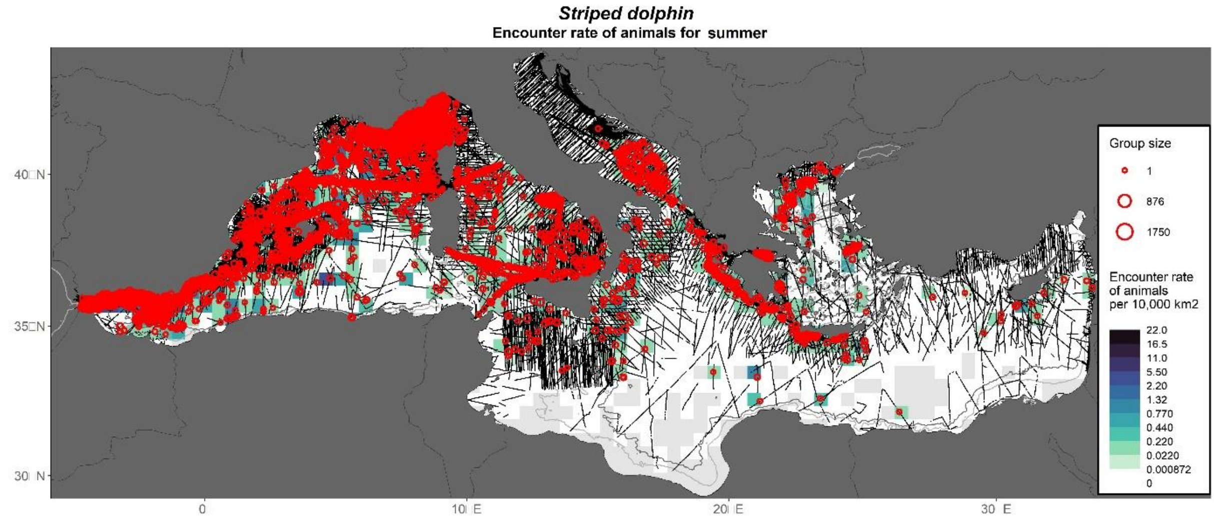

Figure B-78. Map of encounter rates of striped dolphin in summer, with observations and tracks.

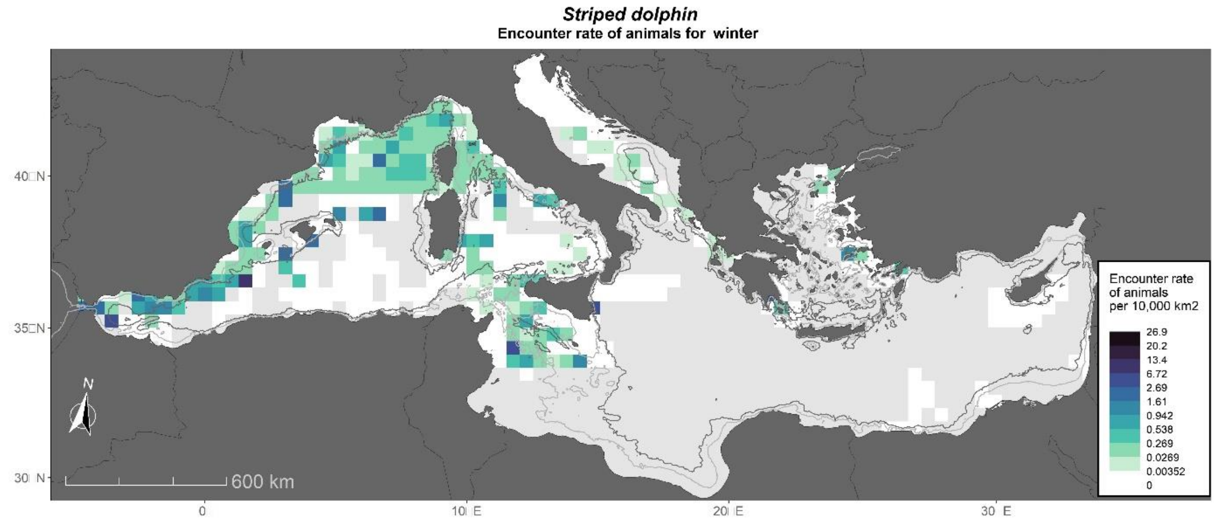

Figure B-79. Map of encounter rates of striped dolphin in winter.

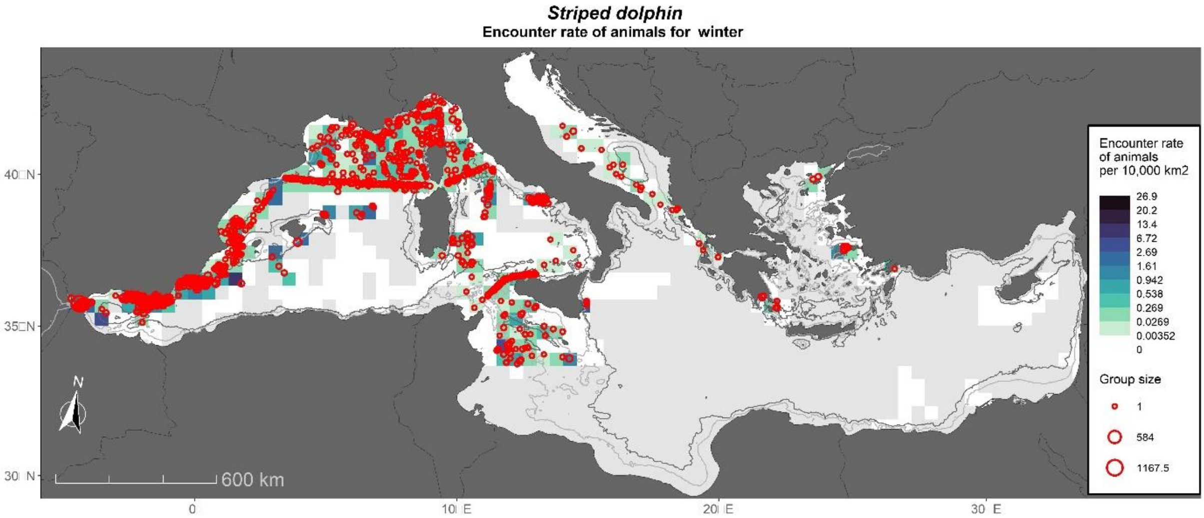

Figure B-80. Map of encounter rates of striped dolphin in winter, with observations.

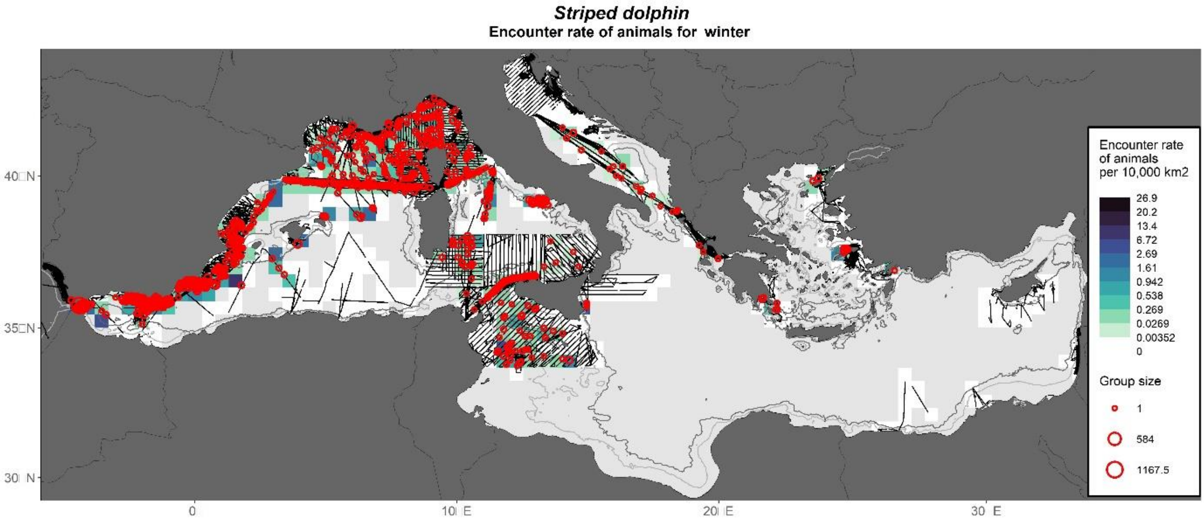

Figure B-81. Map of encounter rates of striped dolphin in winter, with observations and tracks.

4.9. Harbor porpoise

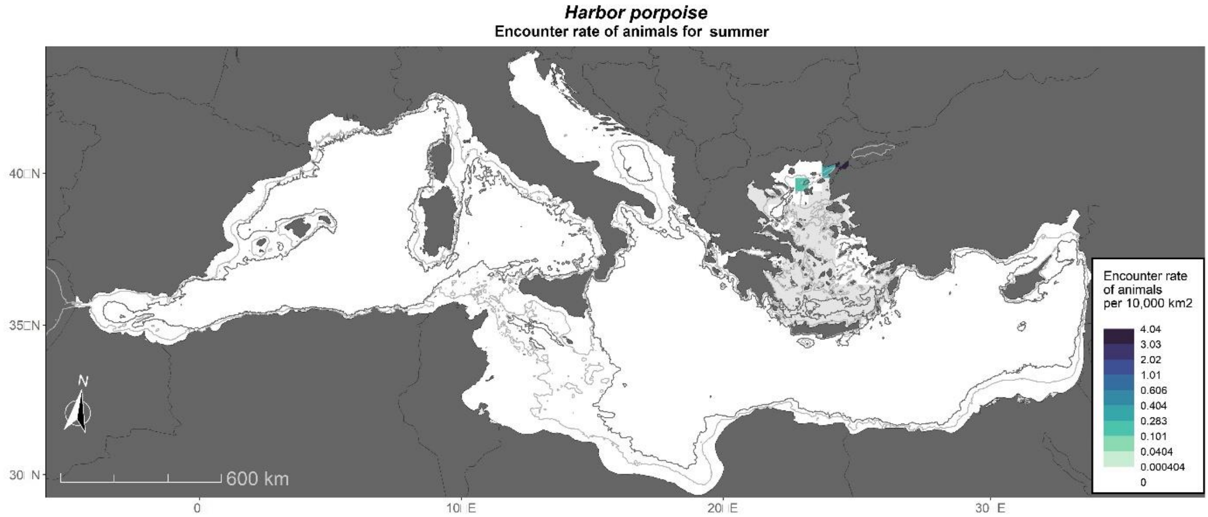

Figure B-82. Map of encounter rates of harbor porpoise in summer.

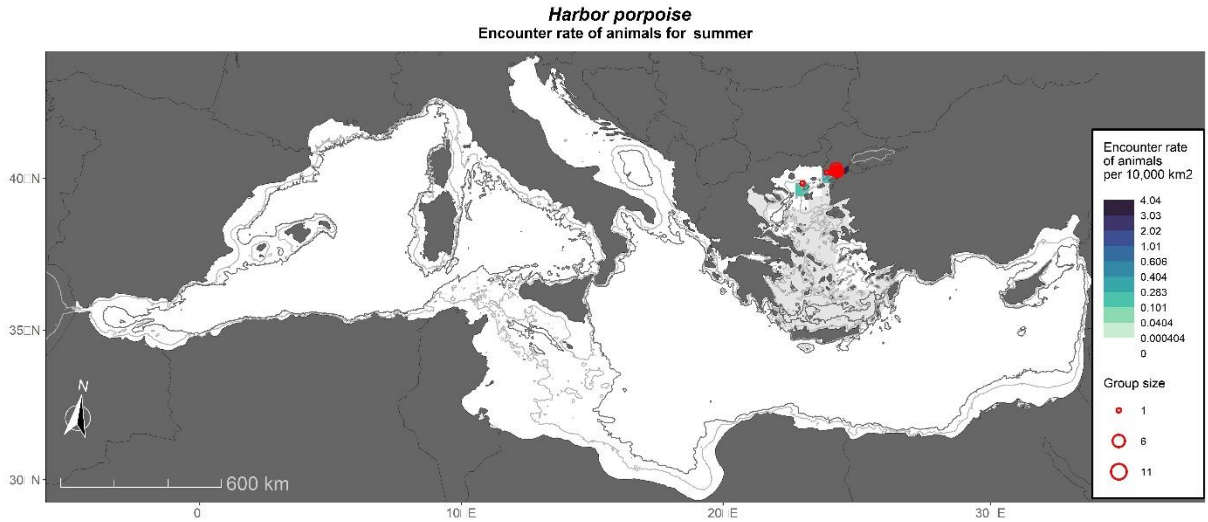

Figure B-83. Map of encounter rates of harbor porpoise in summer, with observations.

Figure B-84. Map of encounter rates of harbor porpoise in summer, with observations and tracks.

4.10. Killer whale

Killer whales were only observed in the Strait of Gibraltar. Therefore, a plot was made in ArcMap showing only this area.

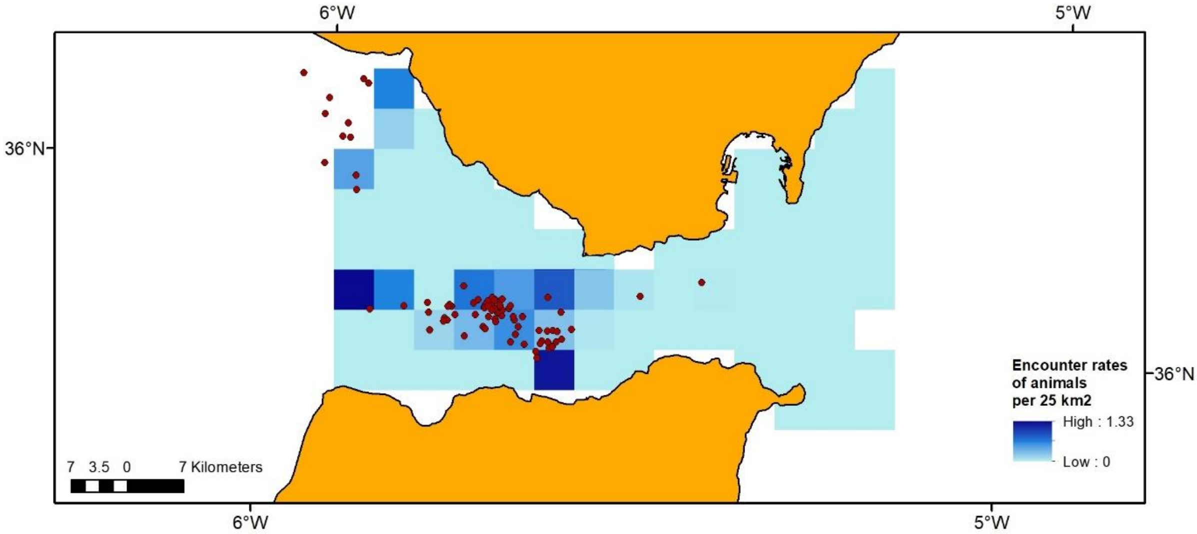

Figure B-85. Map of encounter rates of killer whale all year round, with observations.

C

Detection functions

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Appendix C. Detection Functions

Table of Contents

This appendix provides for each species and platform group the detection function plots and quantile - quantile plots providing an indication of fit. It is structured by platform groups, and then showing the various detection functions for the species and species guilds modeled.

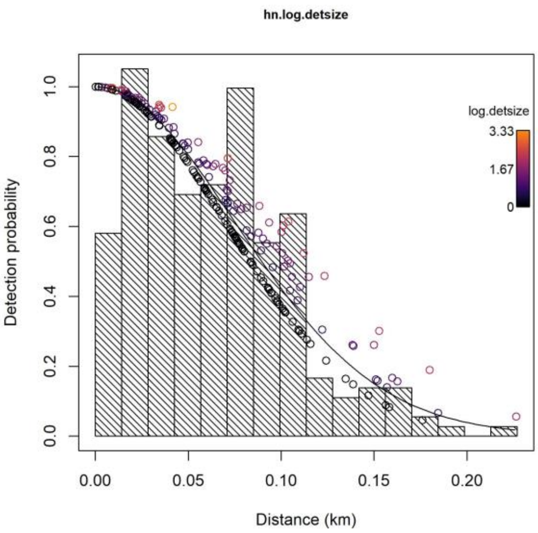
The detection function plots are scaled to 1.0 at 0 perpendicular distance, and the histograms represent the frequency of the observed sightings at different perpendicular distances. Dots represent individual sightings and the effect of the covariates considered.

In the cases of multivariate detection functions, the individual effect of each covariate is shown as a univariate detection function.

1. Detection functions for planes

1.1. Platform Group 123 - B

1.1.1. Common dolphin



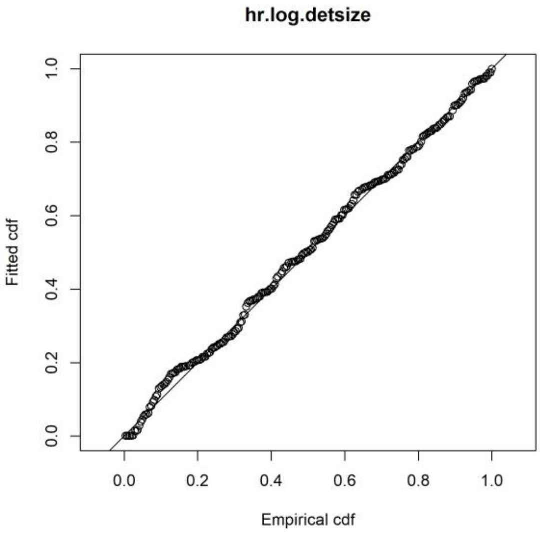
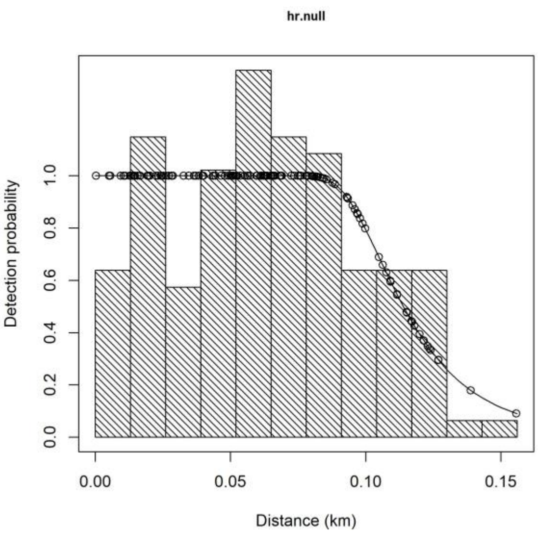


Figure C-1. Plot of the detection function (left) and QQ-Plot (right).

1.1.2. Harbor porpoise



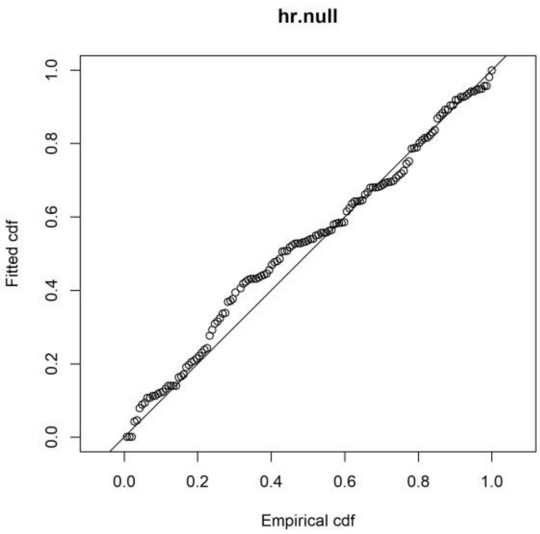


Figure C-2. Plot of the detection function (left) and QQ-Plot (right).

1.1.3. Bottlenose dolphin

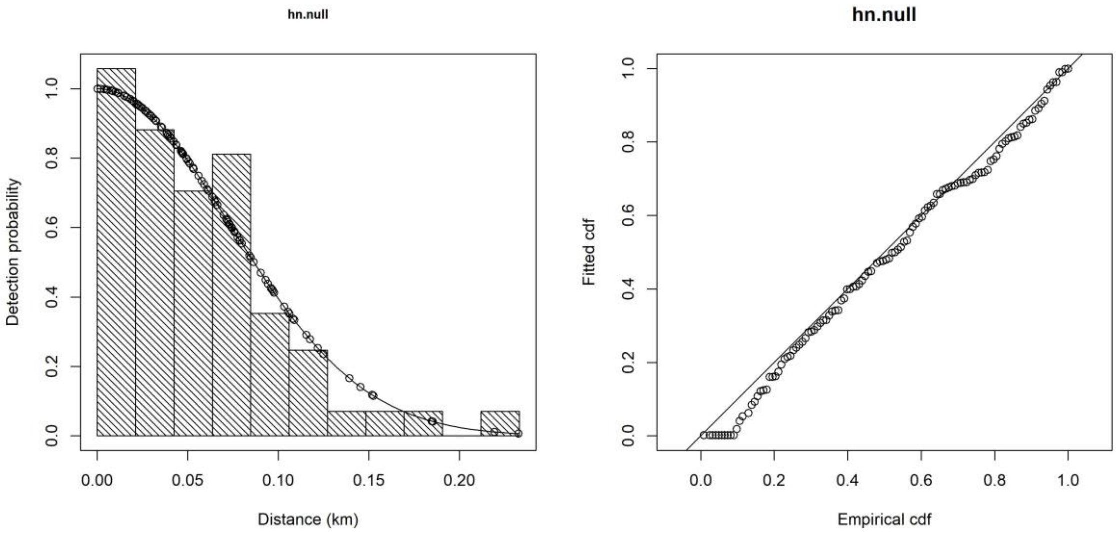


Figure C-3. Plot of the detection function (left) and QQ-Plot (right).

1.2. Platform Group 150 - 229 - F

1.2.1. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

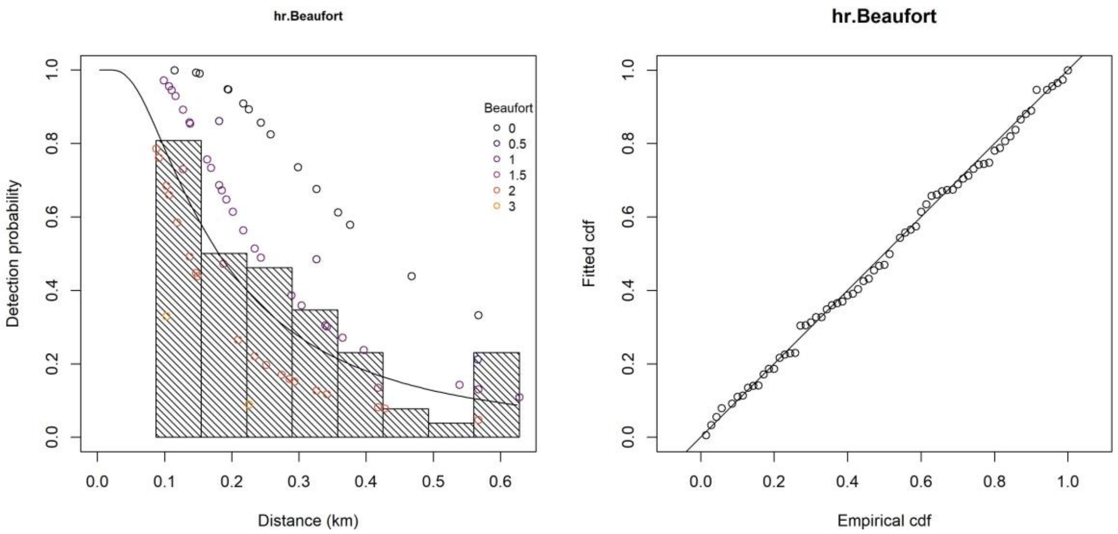


Figure C-4. Plot of the detection function (left) and QQ-Plot (right).

1.2.2. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - Cuvier's beaked whale - Unidentified dolphin - Unidentified large dolphin

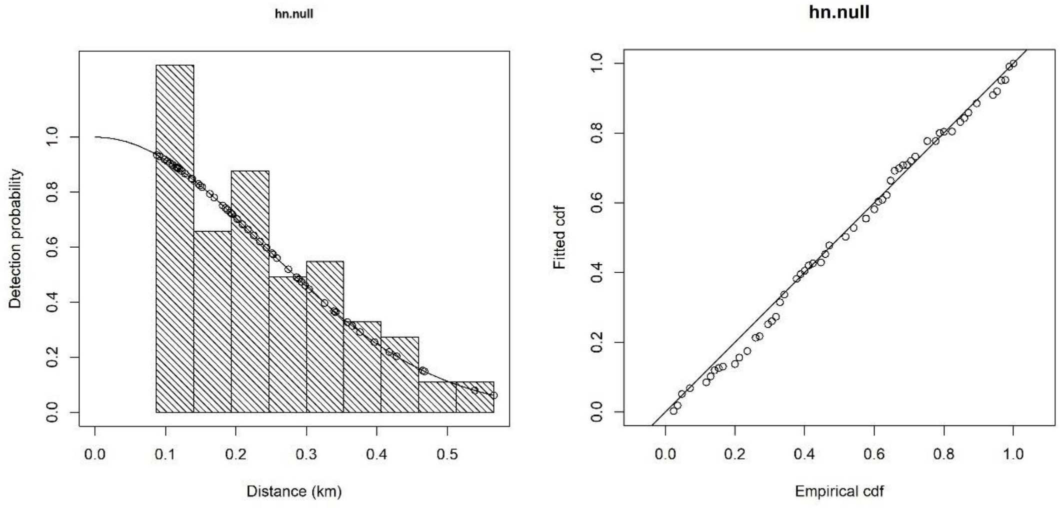


Figure C-5. Plot of the detection function (left) and QQ-Plot (right).

1.3. Platform Group 150 - B

1.3.1. Harbor porpoise

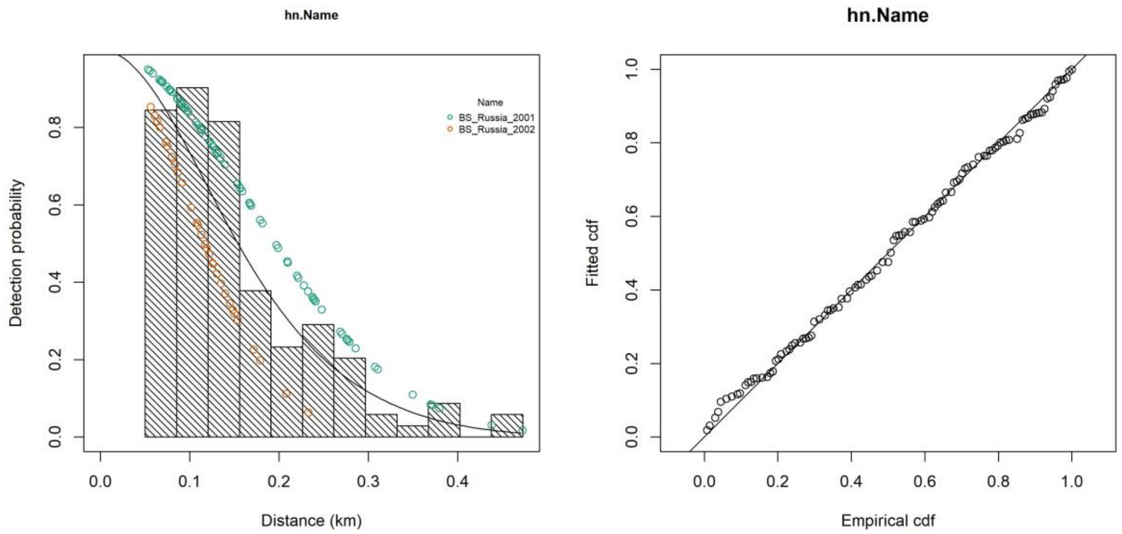


Figure C-6. Plot of the detection function (left) and QQ-Plot (right).

1.3.2. Bottlenose dolphin

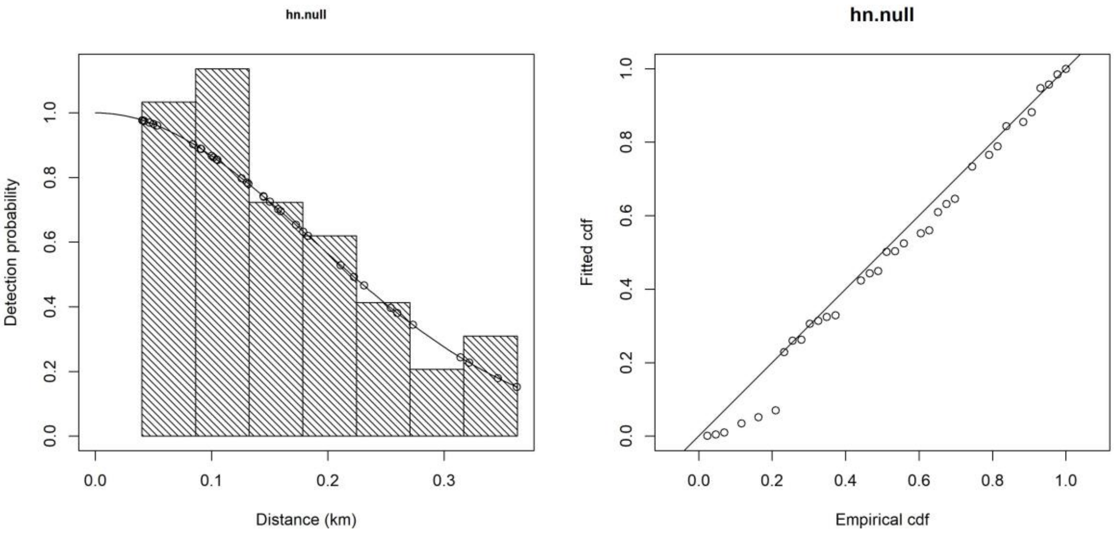


Figure C-7. Plot of the detection function (left) and QQ-Plot (right).

1.4. Platform Group 150 - F

1.4.1. Striped dolphin - Common dolphin

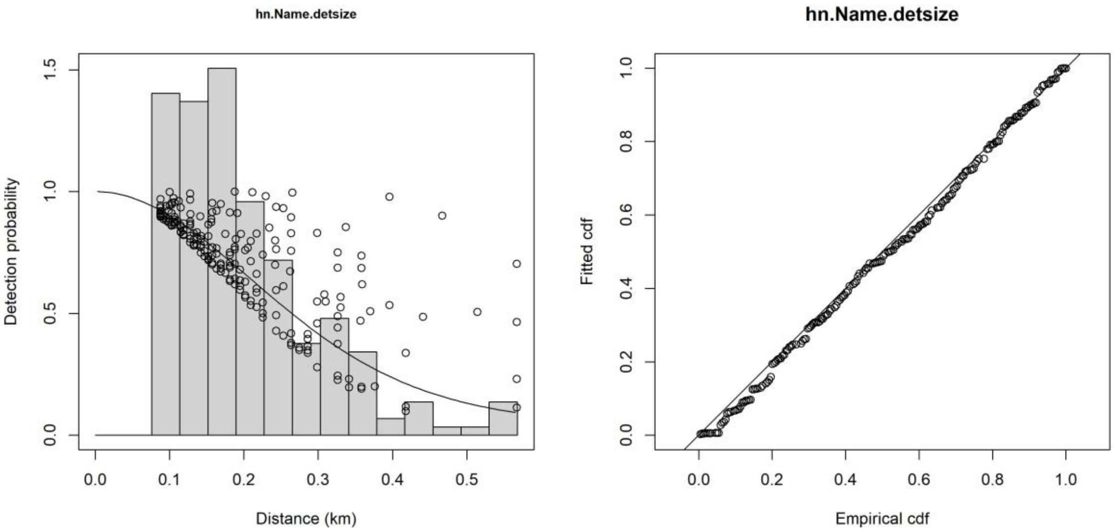


Figure C-8. Plot of the detection function (left) and QQ-Plot (right).

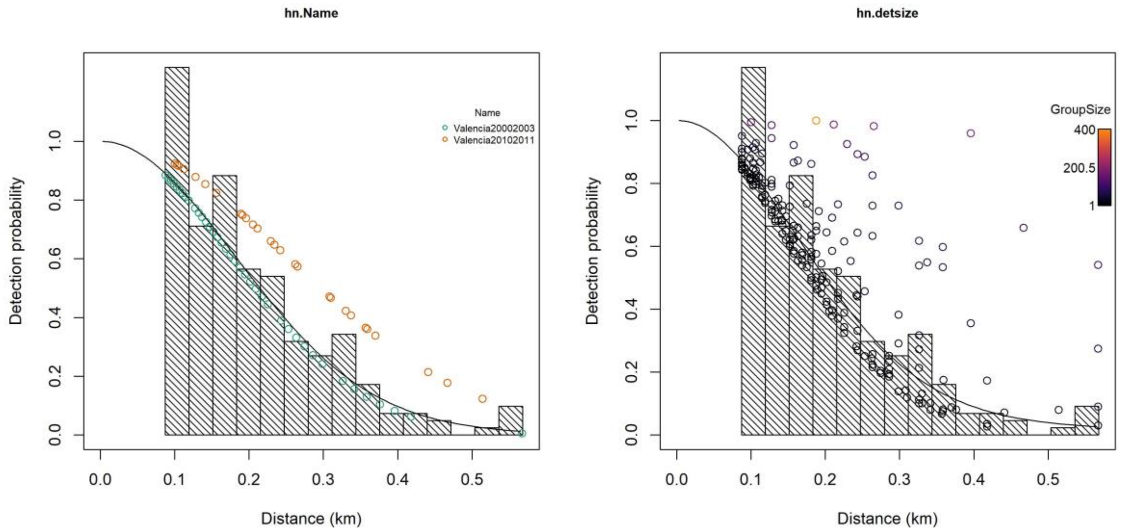


Figure C-9. Detection functions of the individual covariates.

1.4.2. Bottlenose dolphin

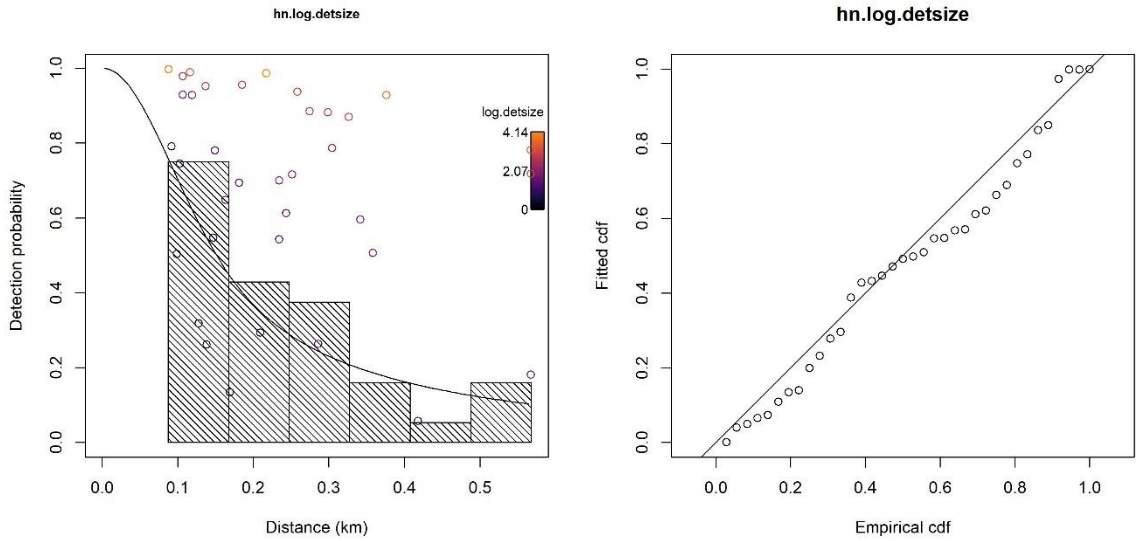


Figure C-10. Plot of the detection function (left) and QQ-Plot (right).

1.4.3. Bottlenose dolphin - Risso's dolphin

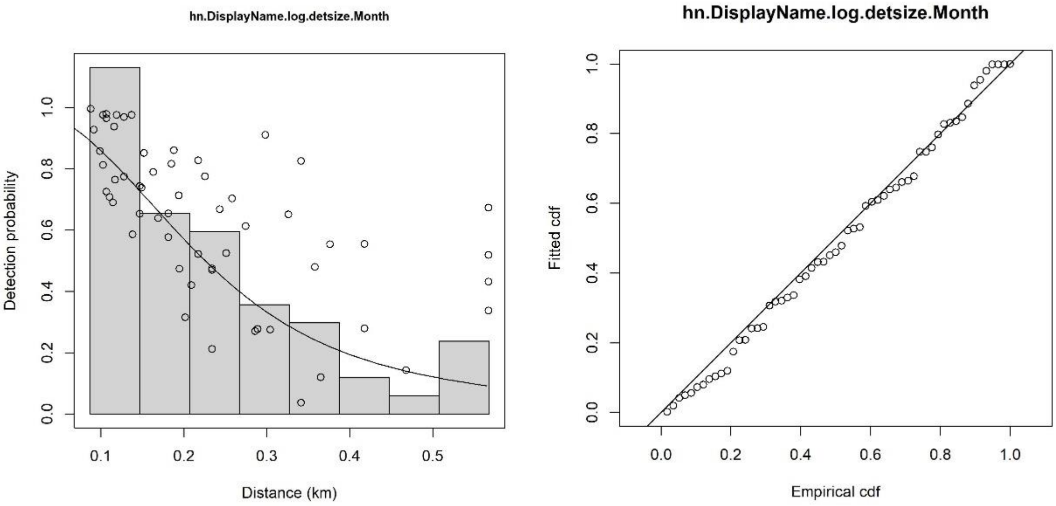


Figure C-11. Plot of the detection function (left) and QQ-Plot (right).

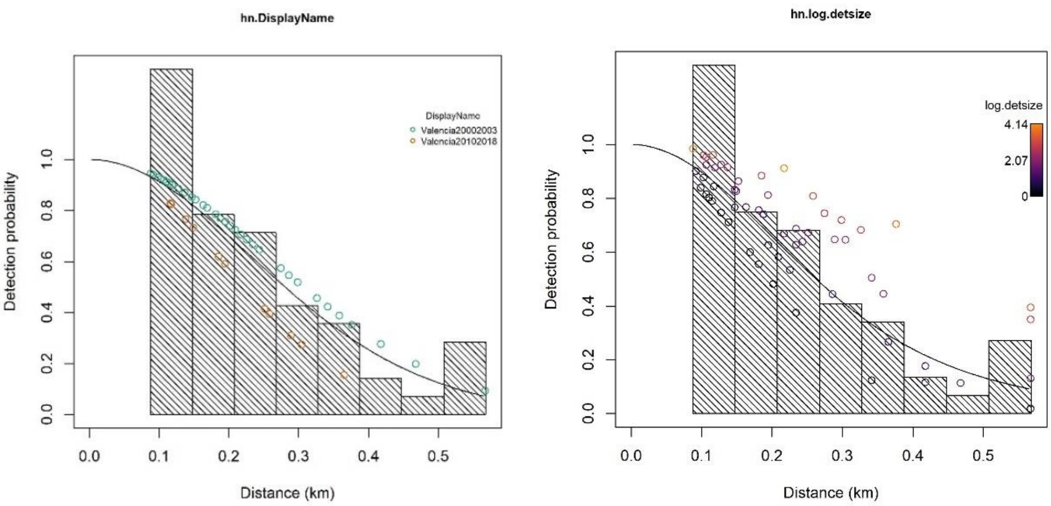


Figure C-12. Detection functions of the individual covariates.

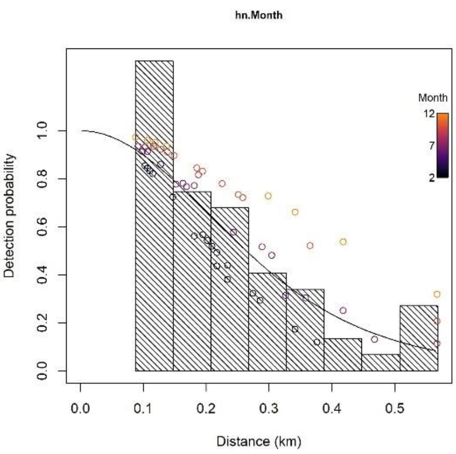


Figure C-13. Detection functions of the individual covariates.

1.4.4. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - Cuvier's beaked whale

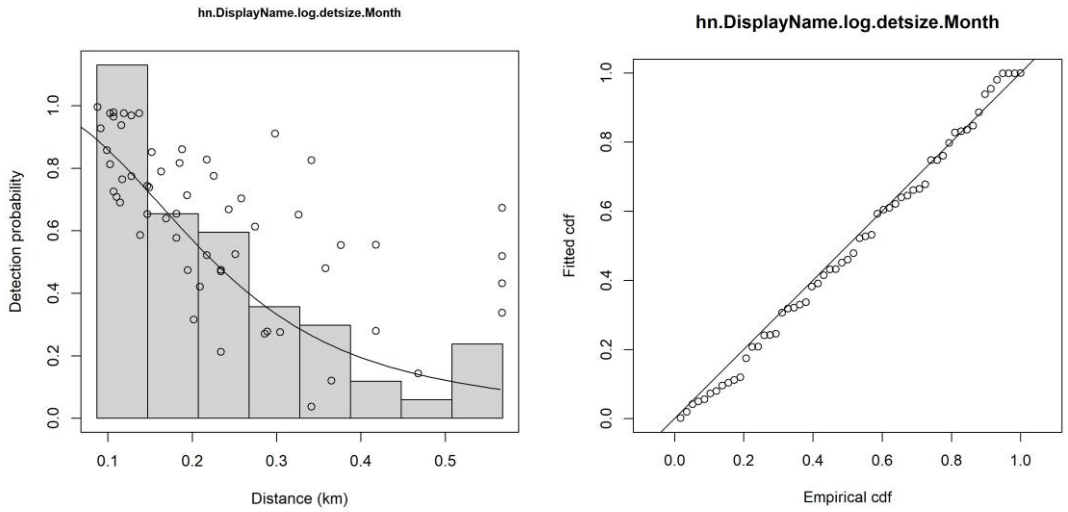


Figure C-13. Plot of the detection function (left) and QQ-Plot (right).

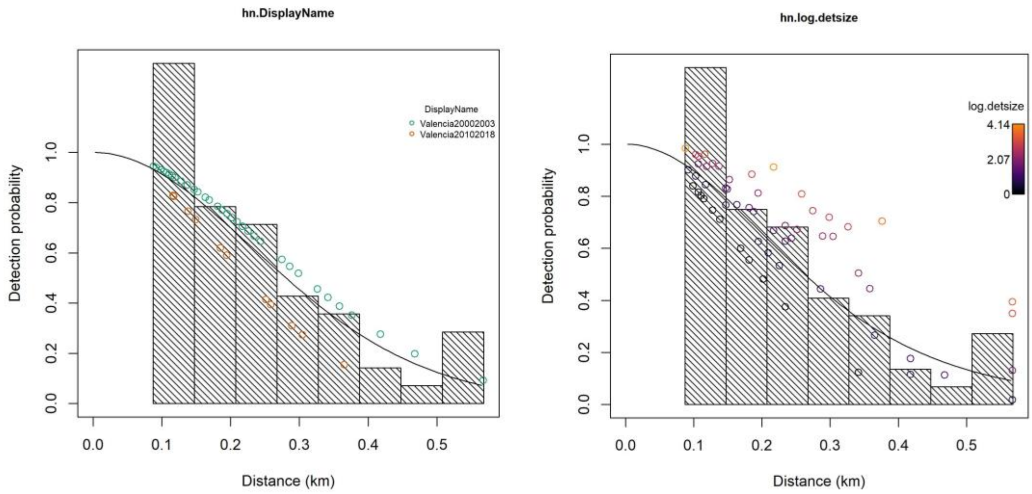


Figure C-14. Detection functions of the individual covariates.

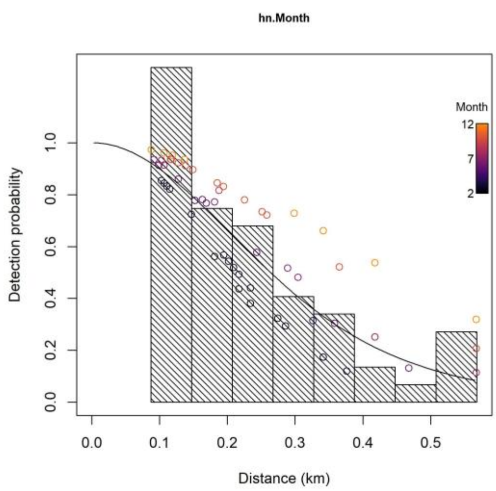


Figure C-15. Detection functions of the individual covariates.

1.5. Platform Group 183 - 200 - 229 - B

1.5.1. Cuvier's beaked whale and Unidentified beaked whale

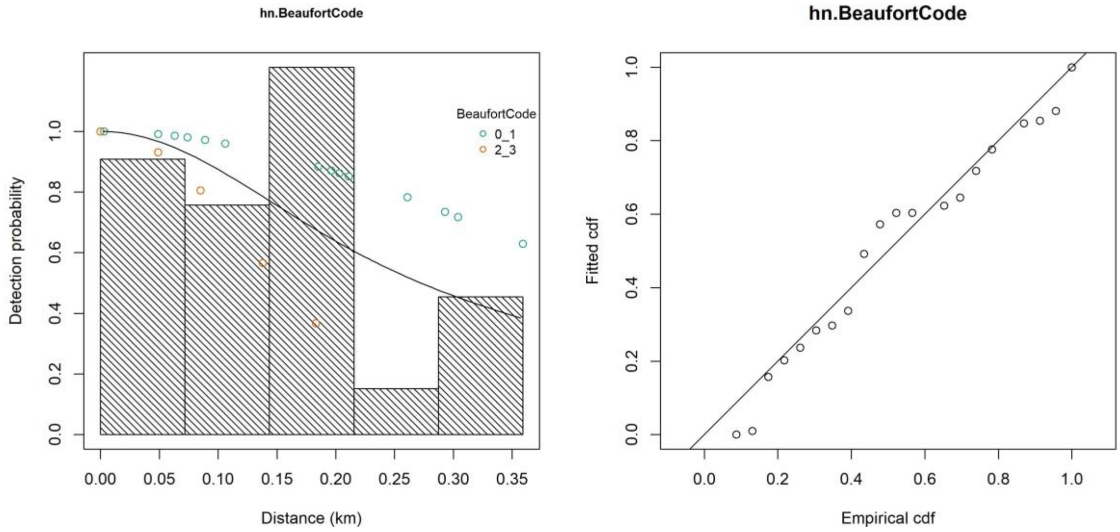


Figure C-16. Plot of the detection function (left) and QQ-Plot (right).

1.5.2. Long-finned pilot whale

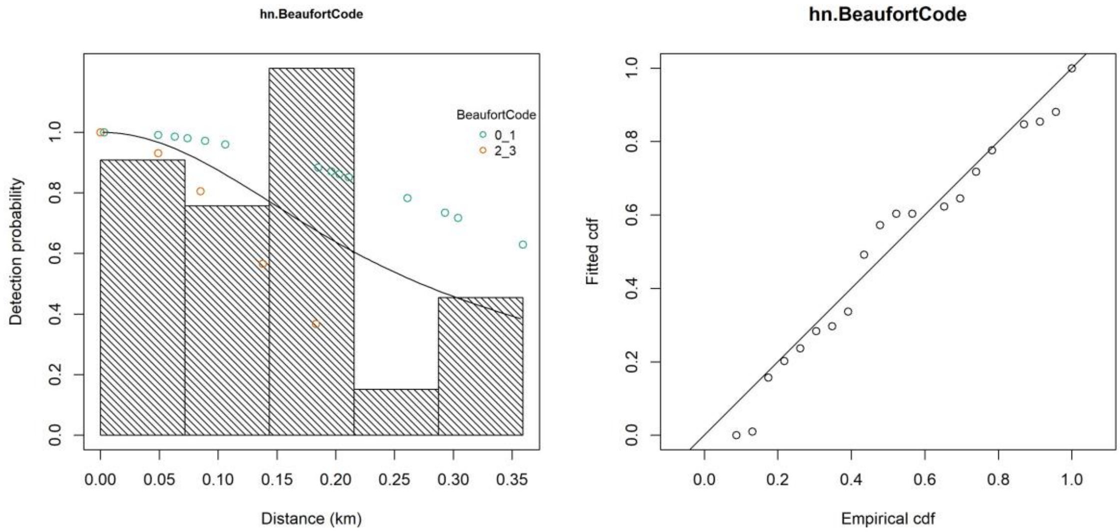


Figure C-17. Plot of the detection function (left) and QQ-Plot (right).

1.5.3. Long-finned pilot whale - Killer whale

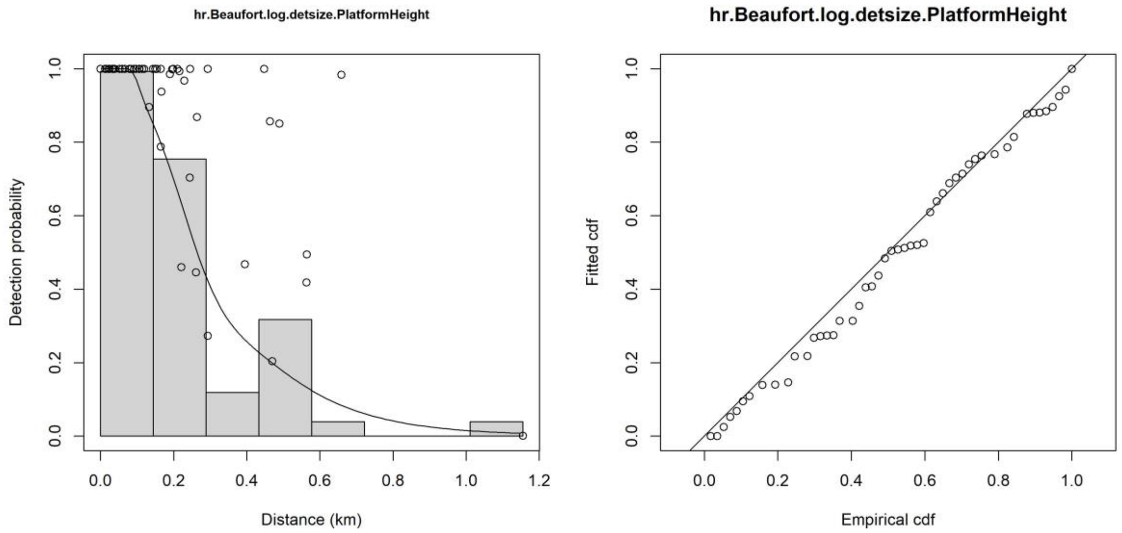


Figure C-18. Plot of the detection function (left) and QQ-Plot (right).

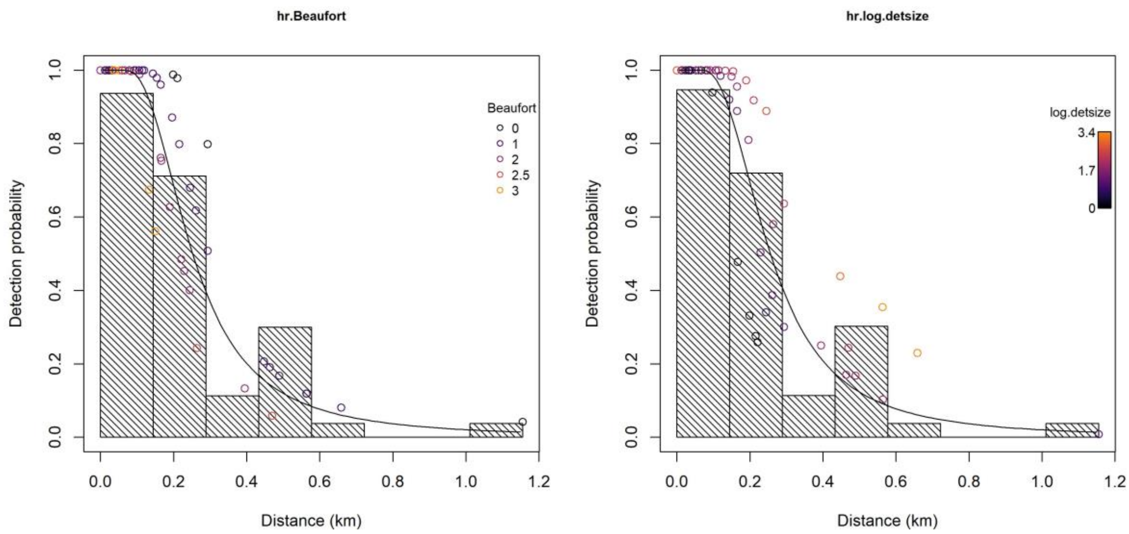


Figure C-19. Detection functions of the individual covariates.

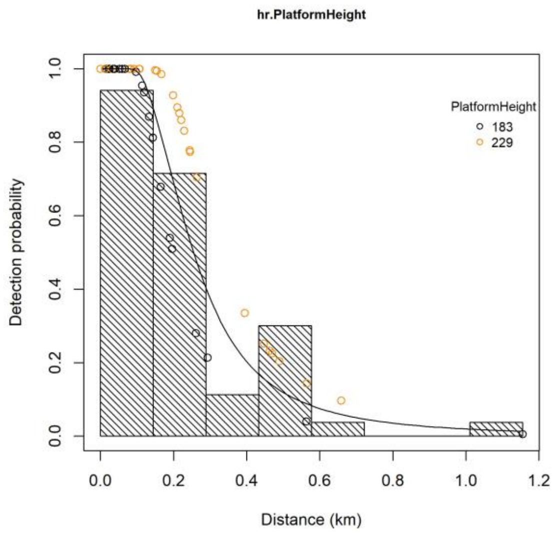


Figure C-20. Detection functions of the individual covariates.

1.5.4. Sperm whale

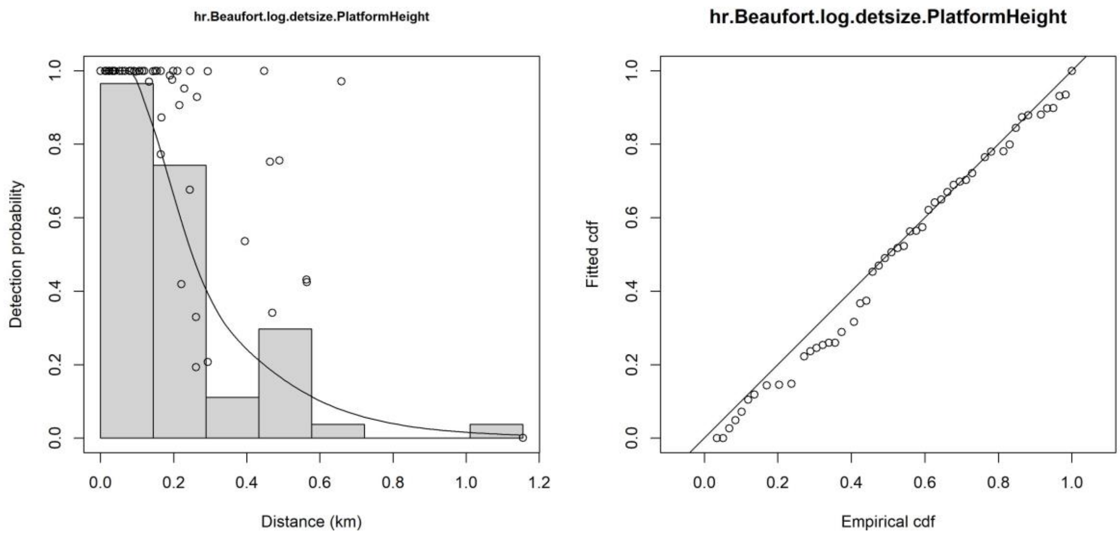


Figure C-21. Plot of the detection function (left) and QQ-Plot (right).

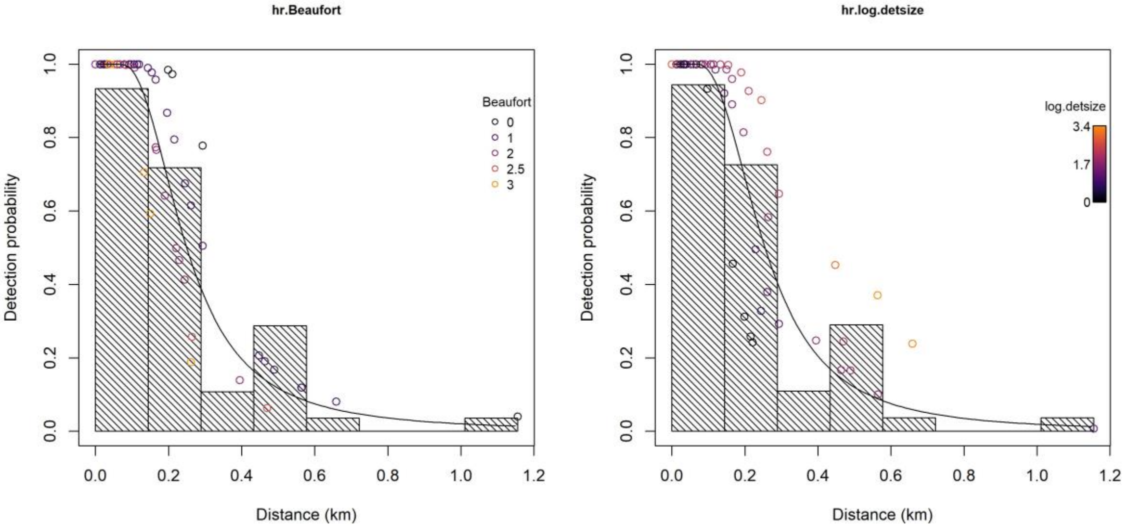


Figure C-22. Detection functions of the individual covariates.

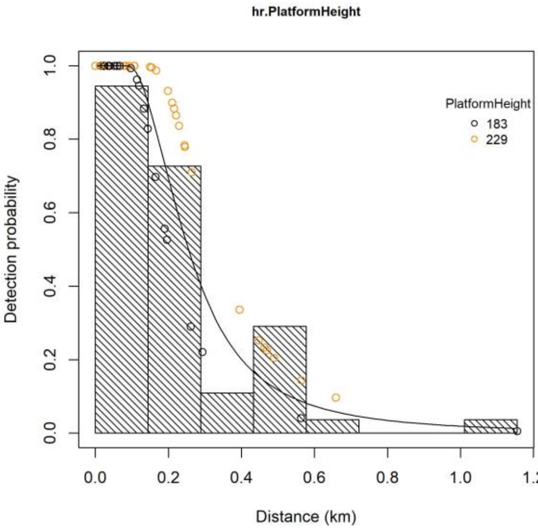


Figure C-23. Detection functions of the individual covariates.

1.6. Platform Group 183 - 200 - B

1.6.1. Fin whale - Unidentified Balaenoptera

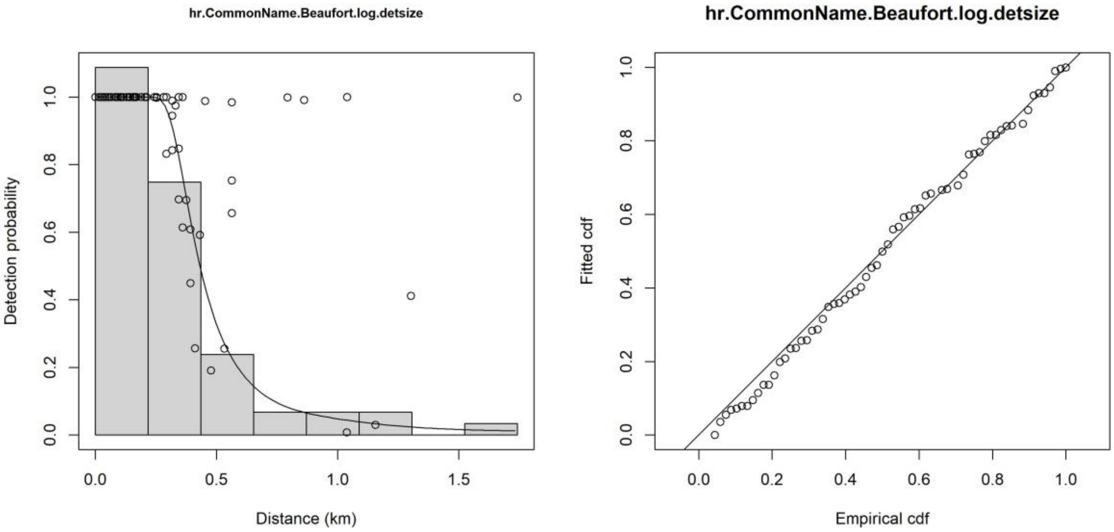


Figure C-24. Plot of the detection function (left) and QQ-Plot (right).

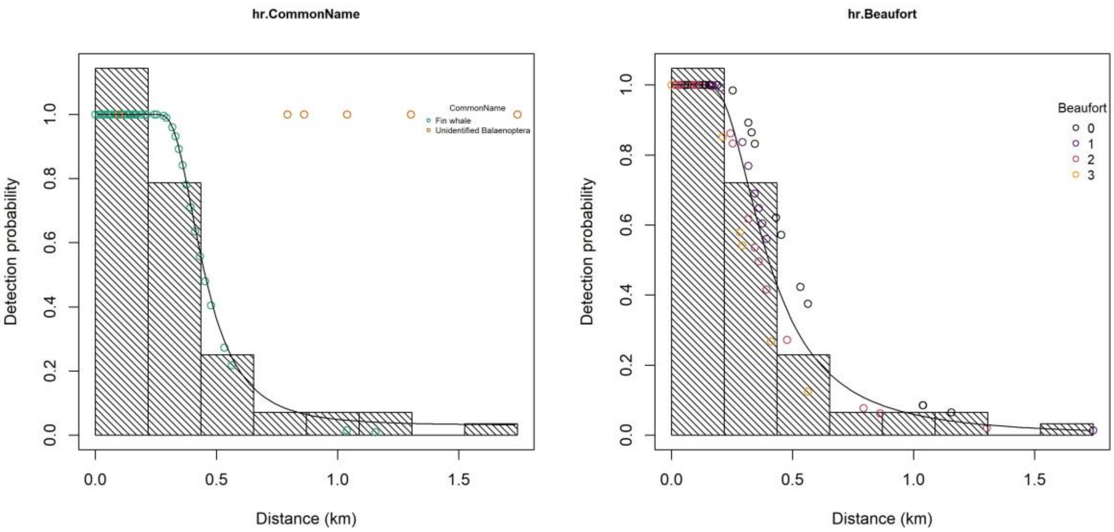


Figure C-25. Detection functions of the individual covariates.

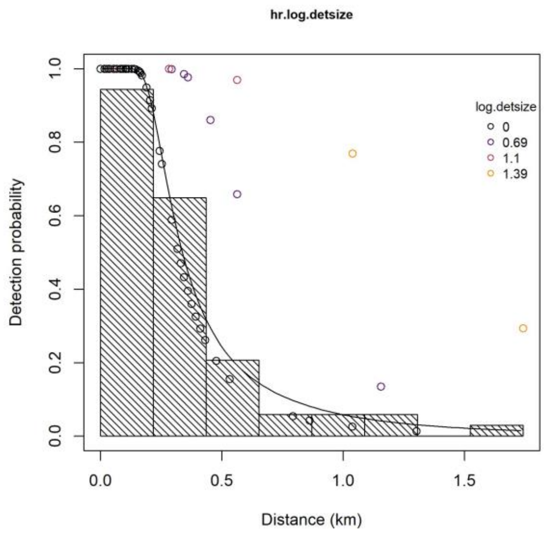


Figure C-26. Detection functions of the individual covariates.

1.6.2. Unidentified small dolphin

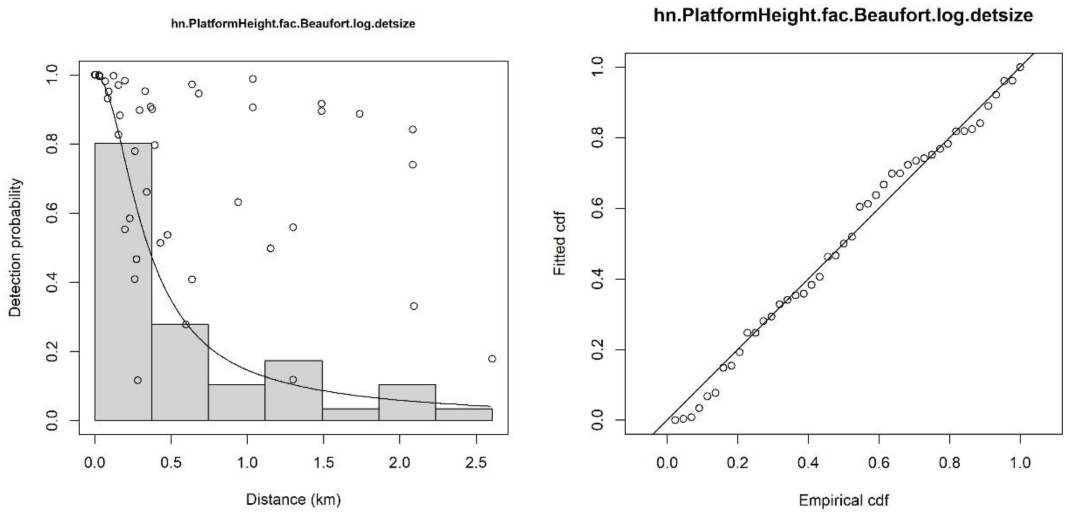


Figure C-27. Plot of the detection function (left) and QQ-Plot (right).

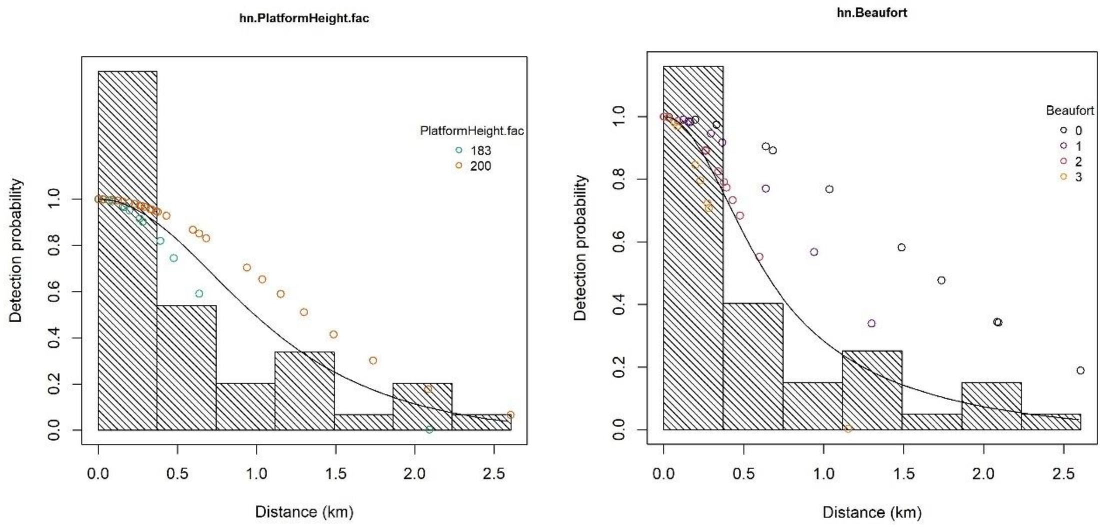


Figure C-28. Detection functions of the individual covariates.

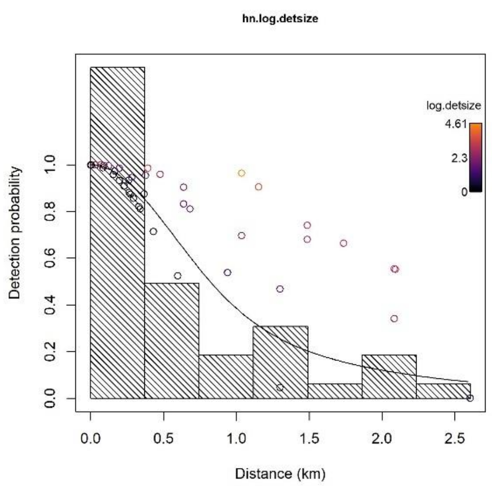


Figure C-29. Detection functions of the individual covariates.

1.7. Platform Group 183 - 229 - B

1.7.1. Striped dolphin or Common dolphin

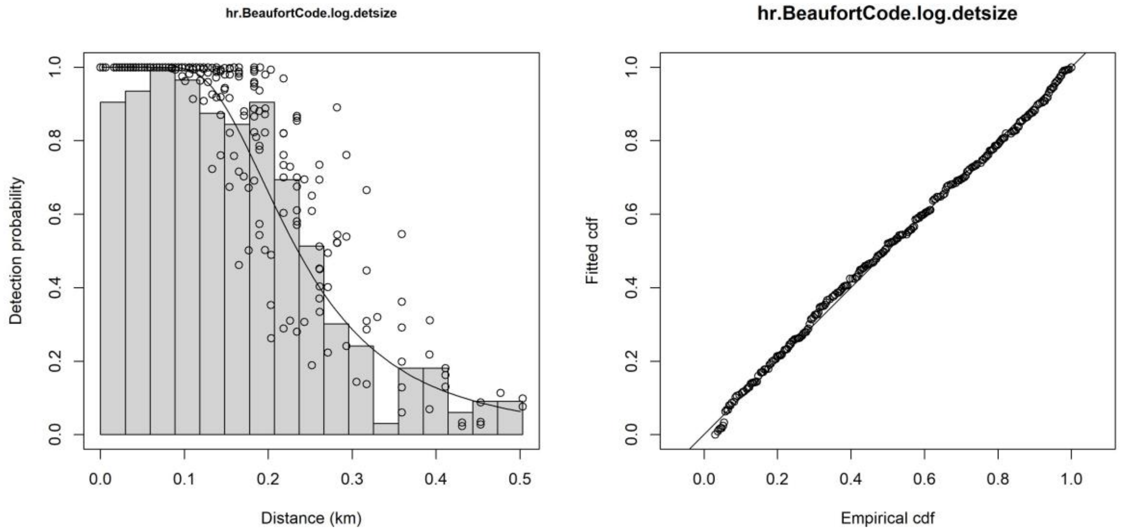


Figure C-30. Plot of the detection function (left) and QQ-Plot (right).

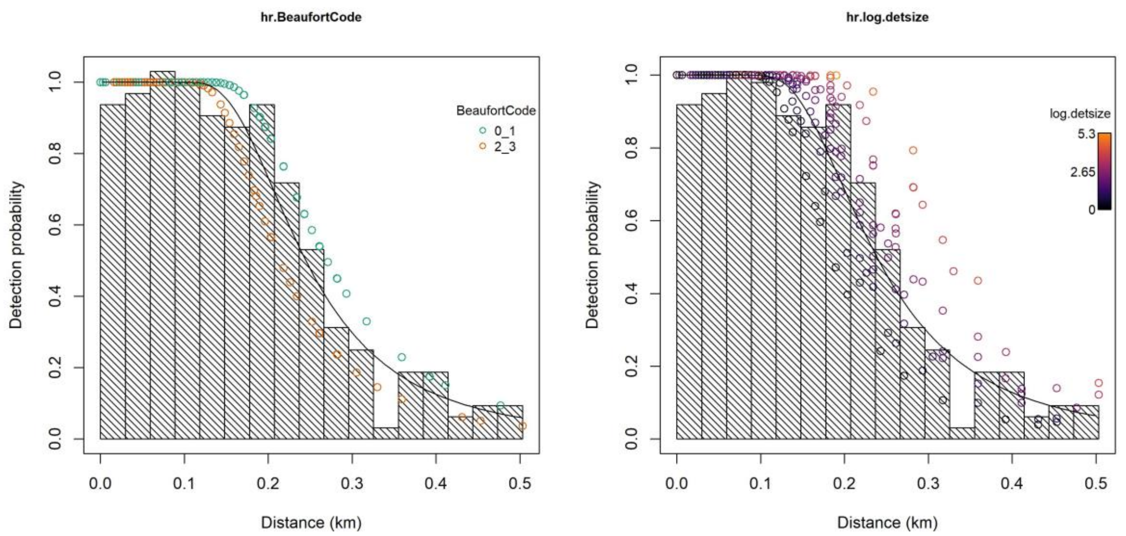


Figure C-31. Detection functions of the individual covariates.

1.8. Platform Group 183 - B

1.8.1. Common dolphin

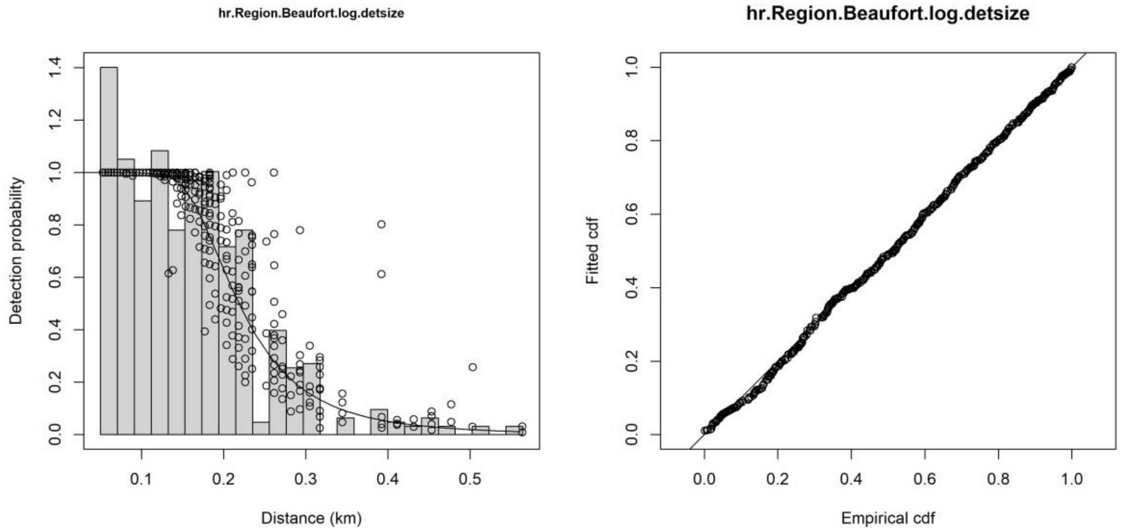


Figure C-32. Plot of the detection function (left) and QQ-Plot (right).

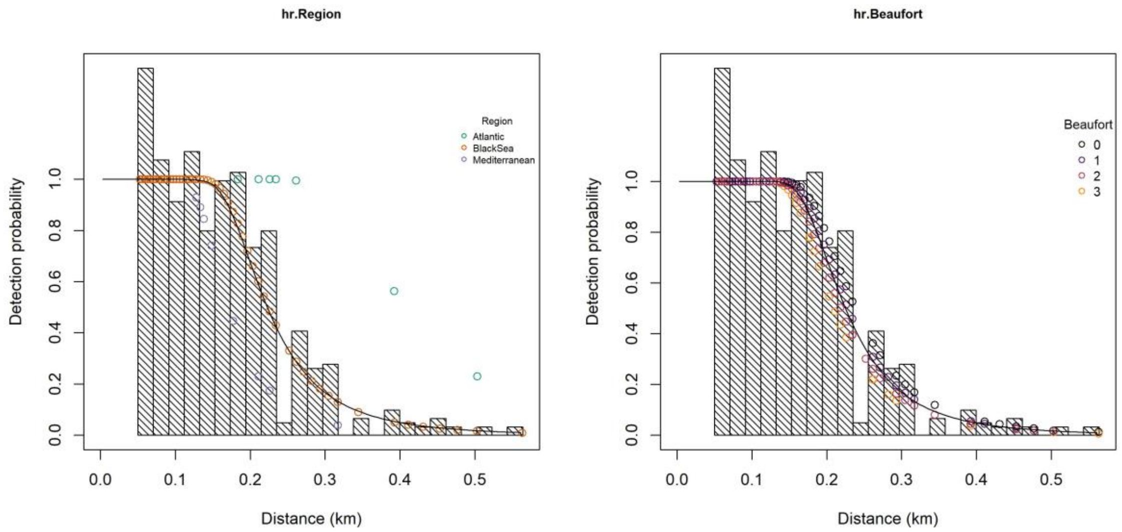


Figure C-33. Detection functions of the individual covariates.

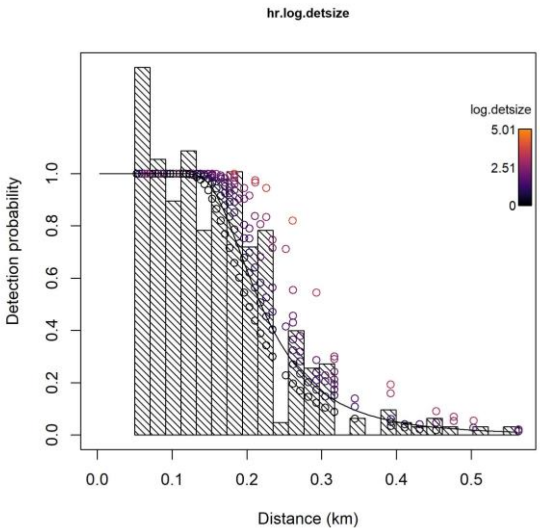


Figure C-34. Detection functions of the individual covariates.

1.8.2. Risso's dolphin

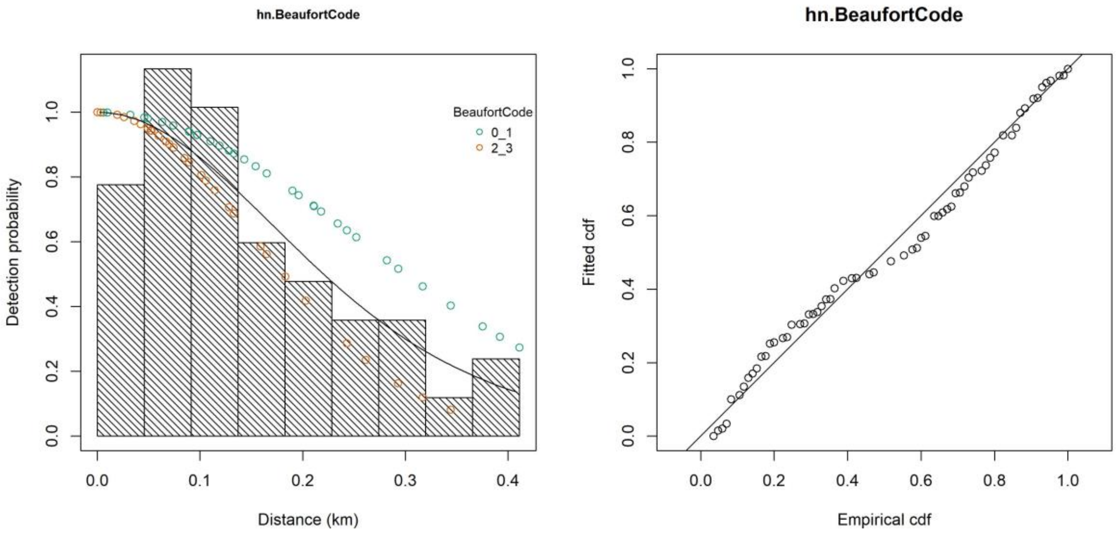


Figure C-35. Plot of the detection function (left) and QQ-Plot (right).

1.8.3. Harbor porpoise

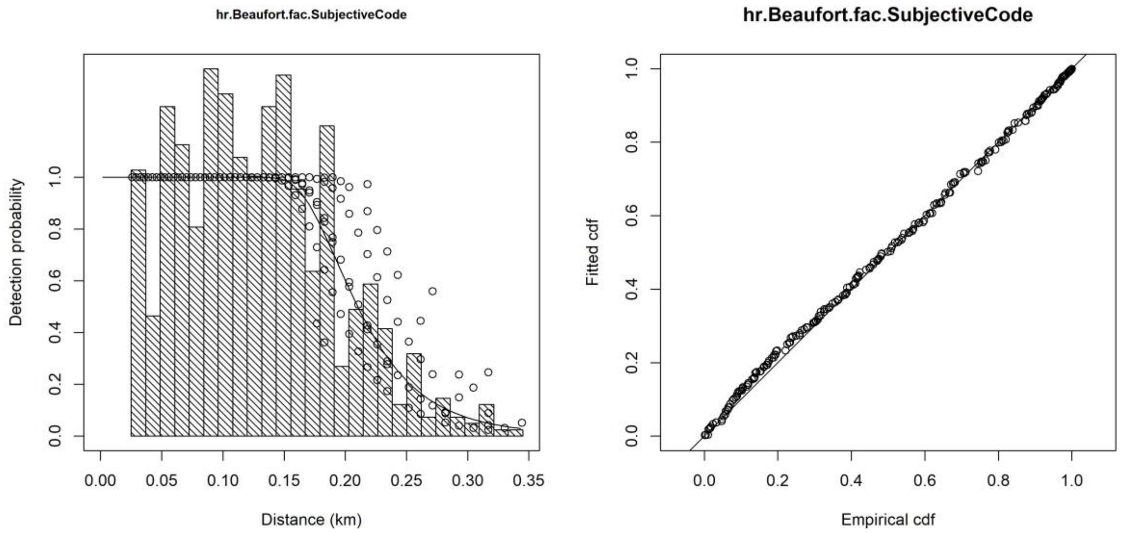


Figure C-36. Plot of the detection function (left) and QQ-Plot (right).

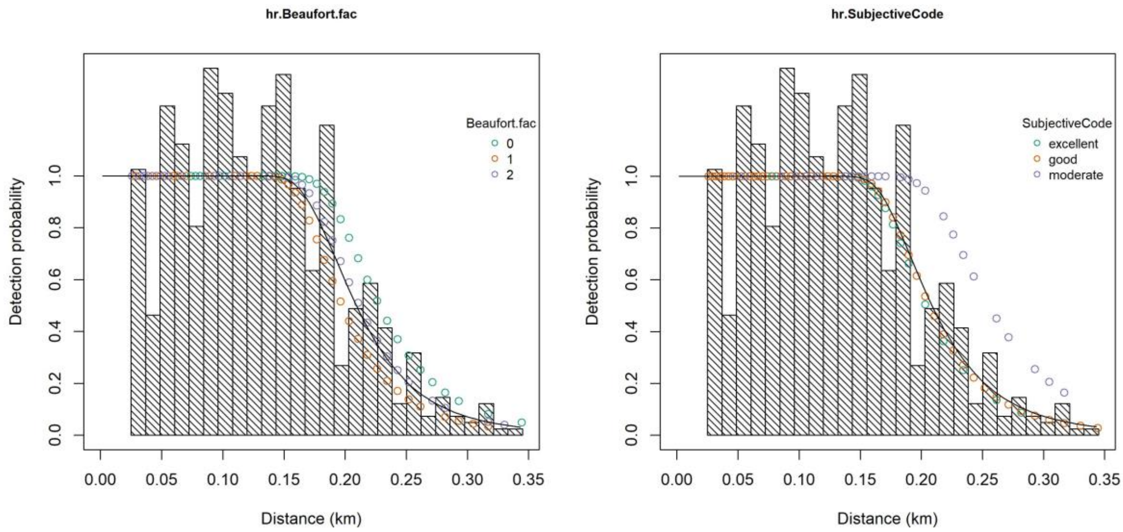


Figure C-37. Detection functions of the individual covariates.

1.8.4. Striped dolphin

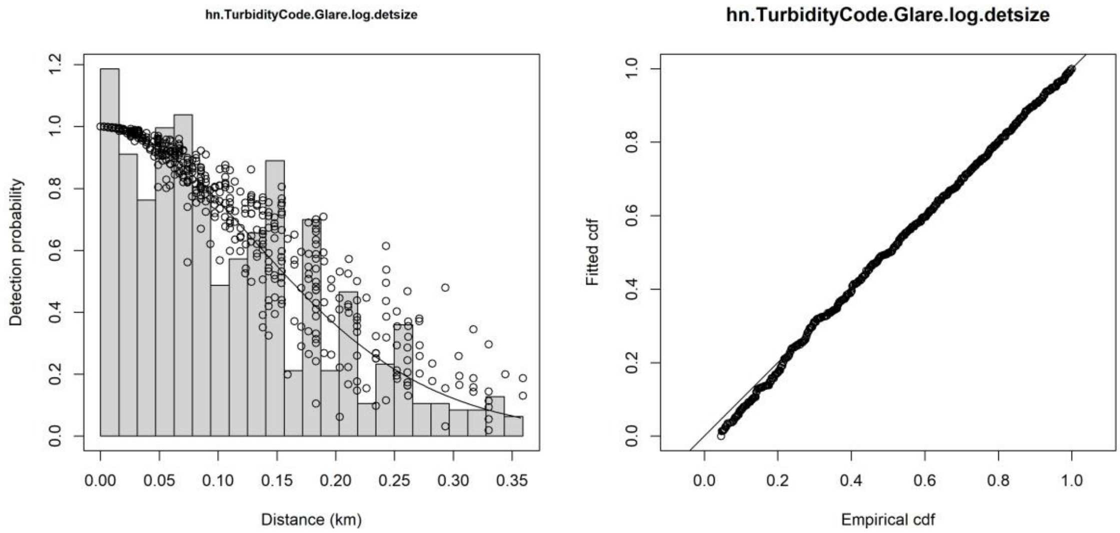


Figure C-38. Plot of the detection function (left) and QQ-Plot (right).

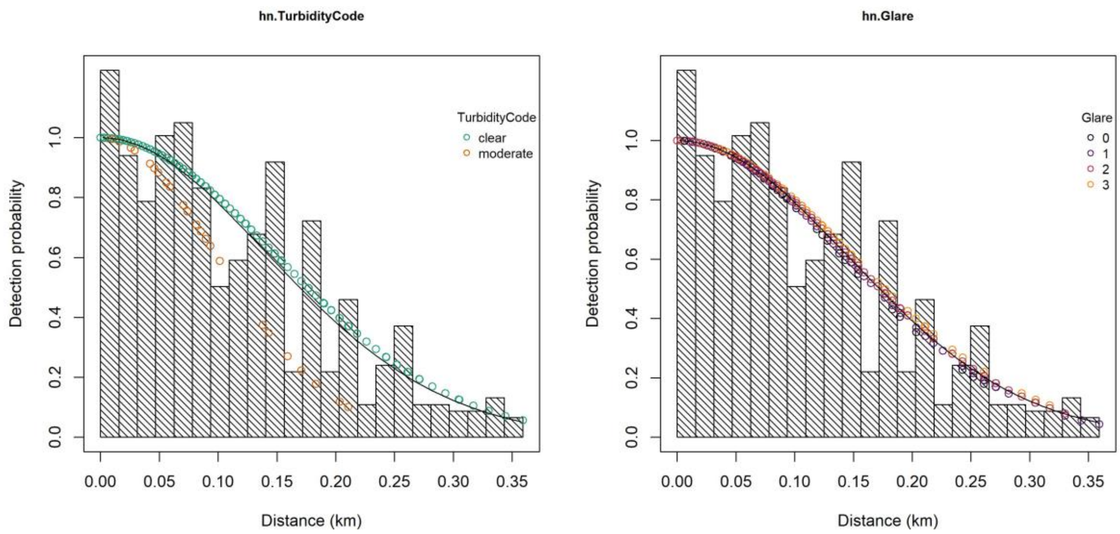


Figure C-39. Detection functions of the individual covariates.

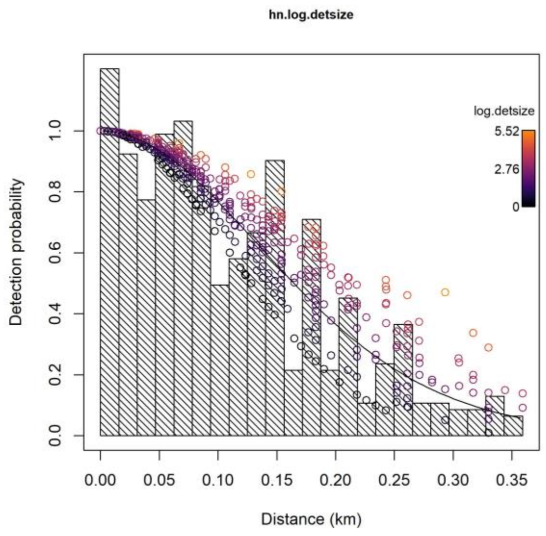


Figure C-40. Detection functions of the individual covariates.

1.8.5. Striped dolphin or Common dolphin

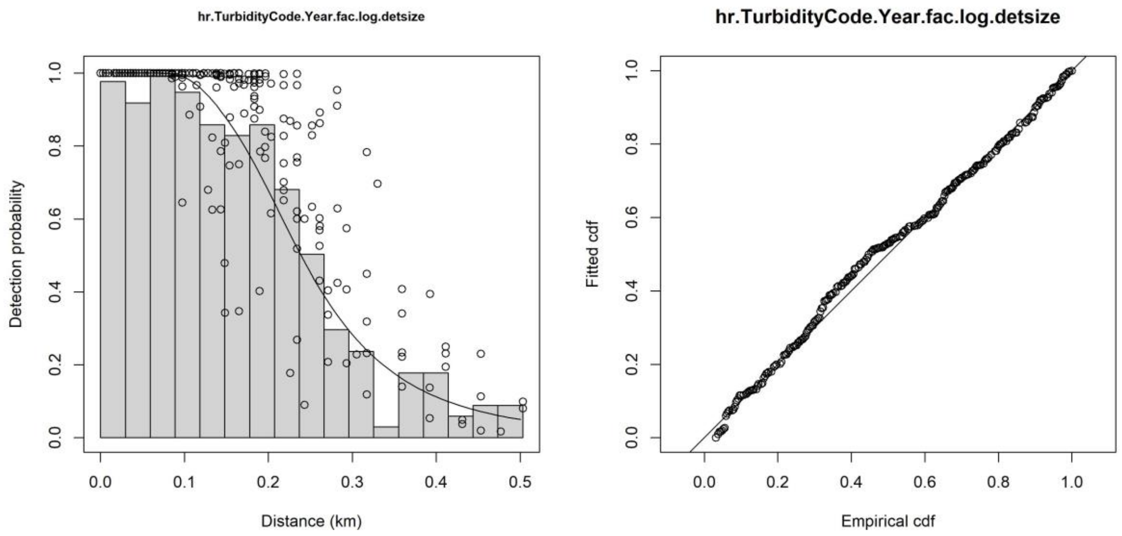


Figure C-41. Plot of the detection function (left) and QQ-Plot (right).

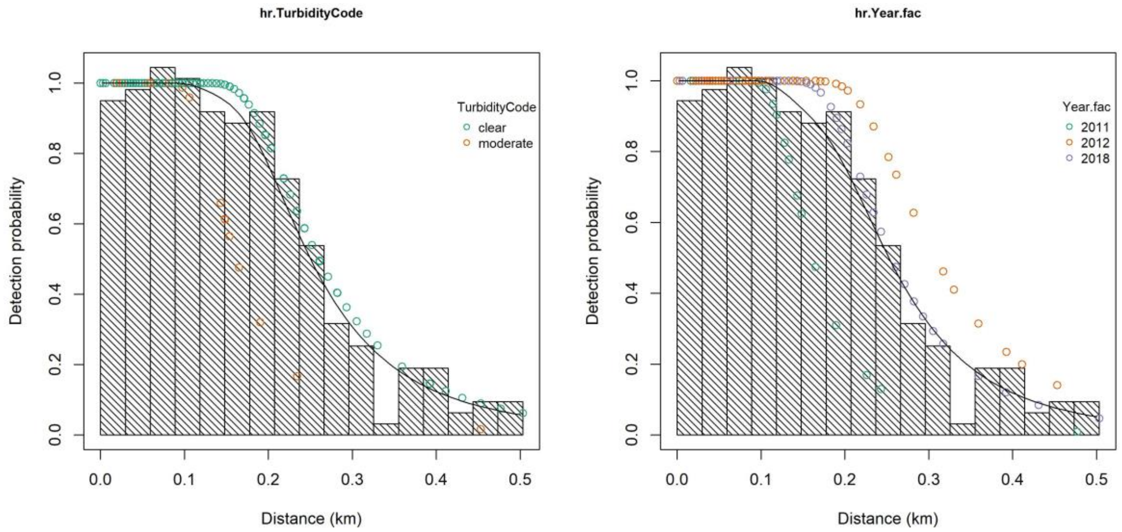


Figure C-42. Detection functions of the individual covariates.

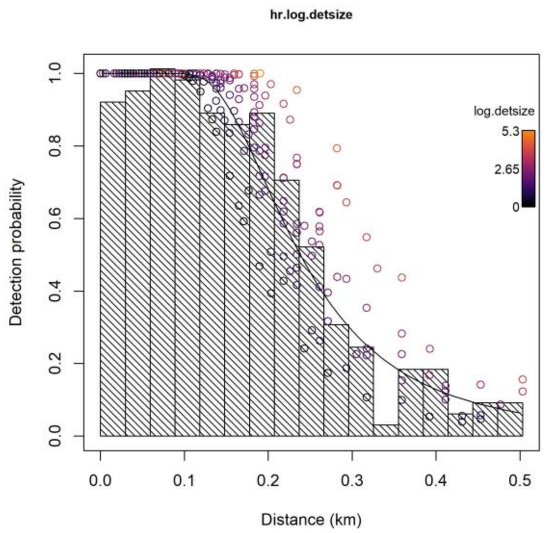


Figure C-43. Detection functions of the individual covariates.

1.8.6. Bottlenose dolphin

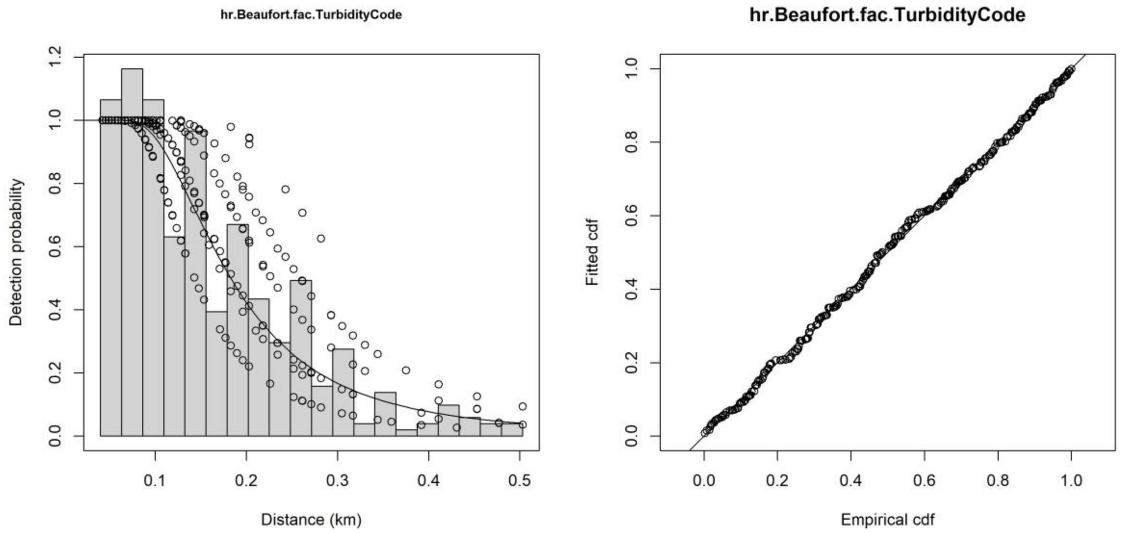


Figure C-44. Plot of the detection function (left) and QQ-Plot (right).

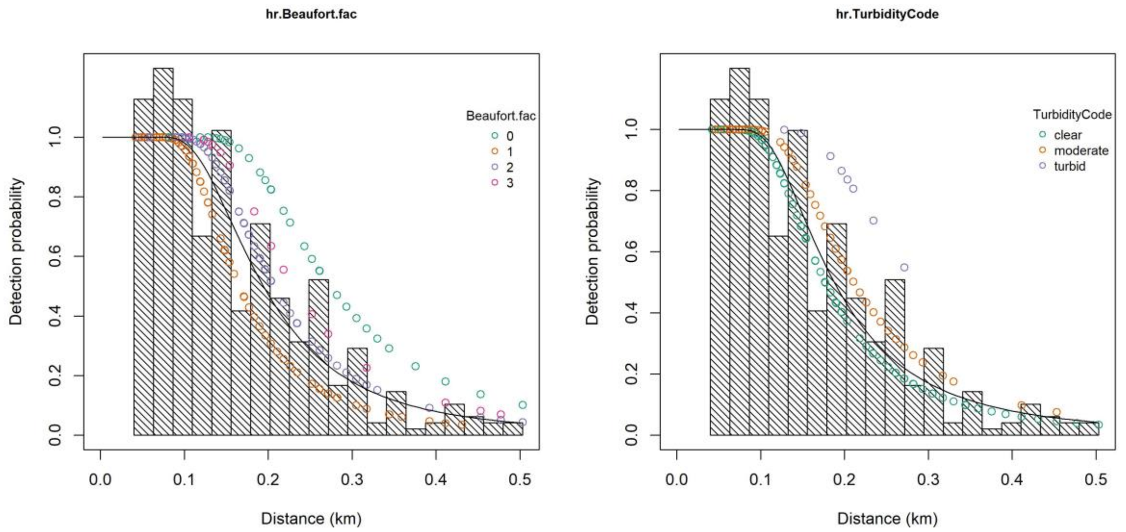


Figure C-45. Detection functions of the individual covariates.

1.8.7. Unidentified dolphin

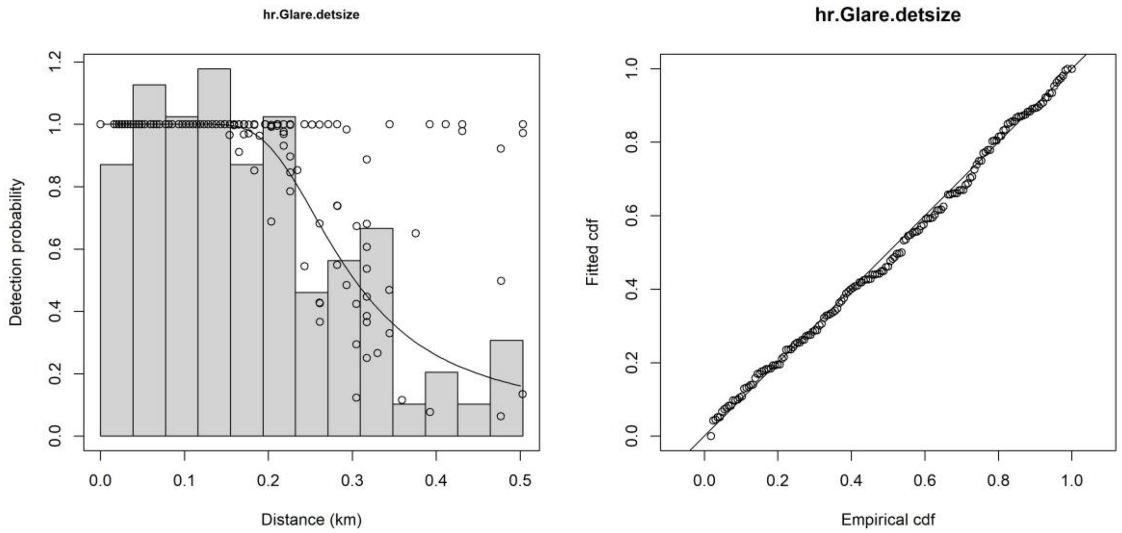


Figure C-46. Plot of the detection function (left) and QQ-Plot (right).

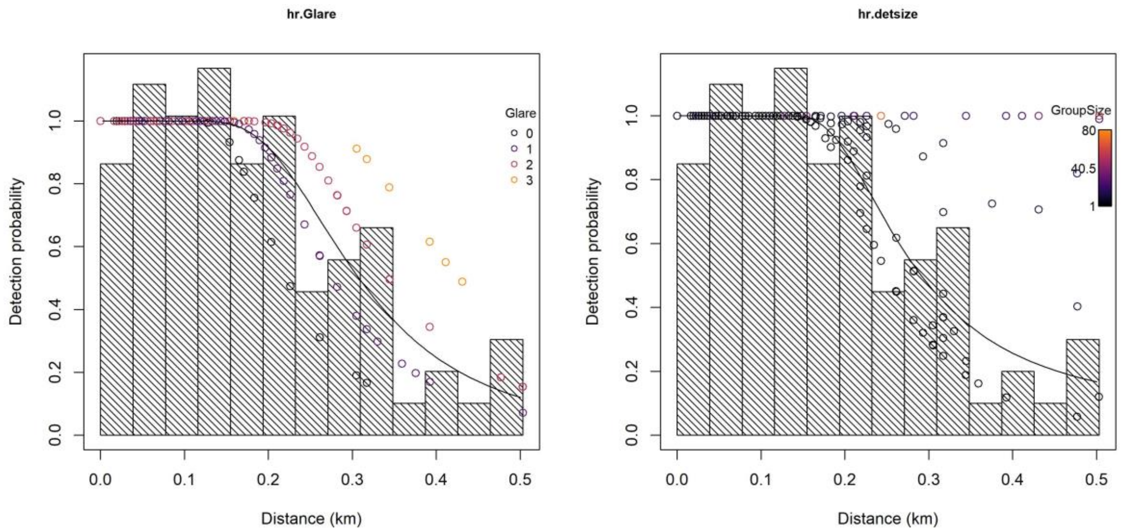


Figure C-47. Detection functions of the individual covariates.

1.9. Platform Group 200 - B

1.9.1. Striped dolphin

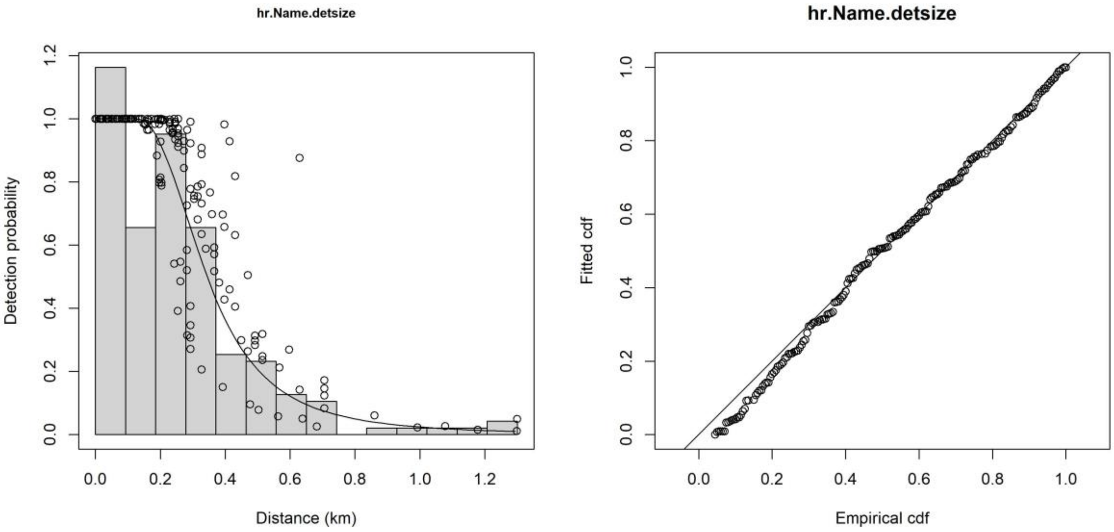


Figure C-48. Plot of the detection function (left) and QQ-Plot (right).

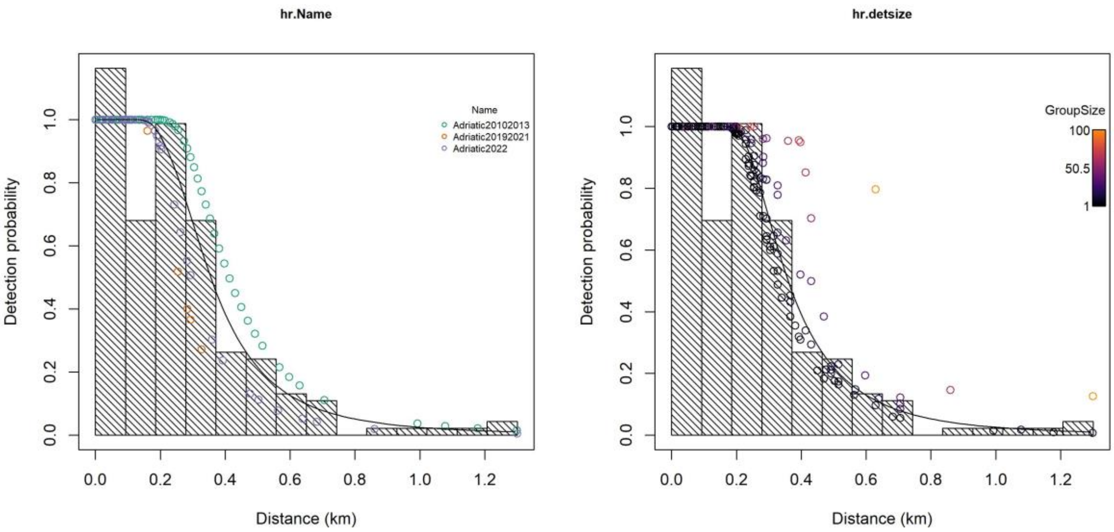


Figure C-40. Detection functions of the individual covariates.

1.9.2. Striped dolphin - Common dolphin

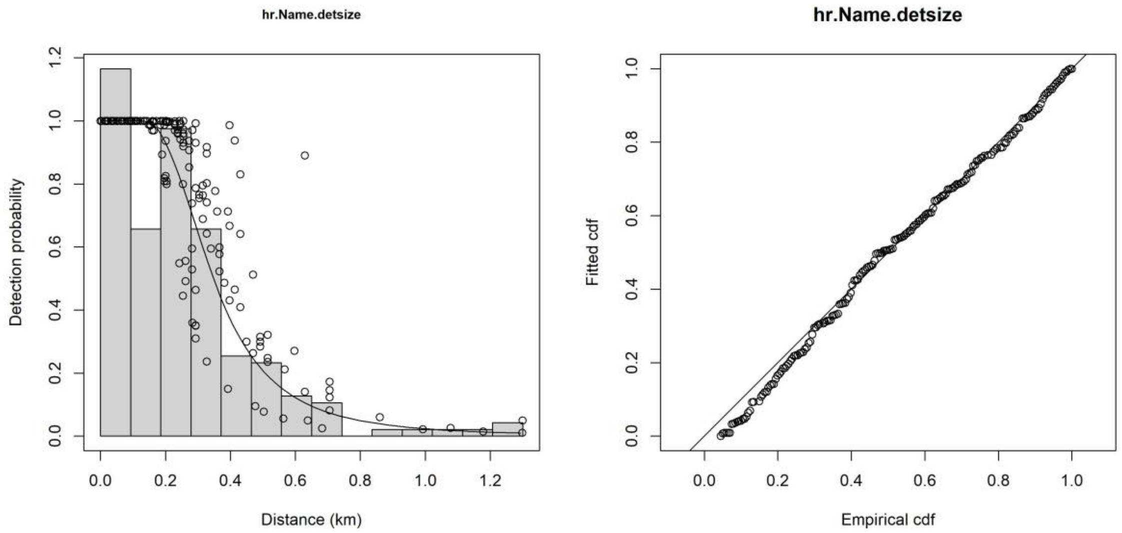


Figure C-50. Plot of the detection function (left) and QQ-Plot (right).

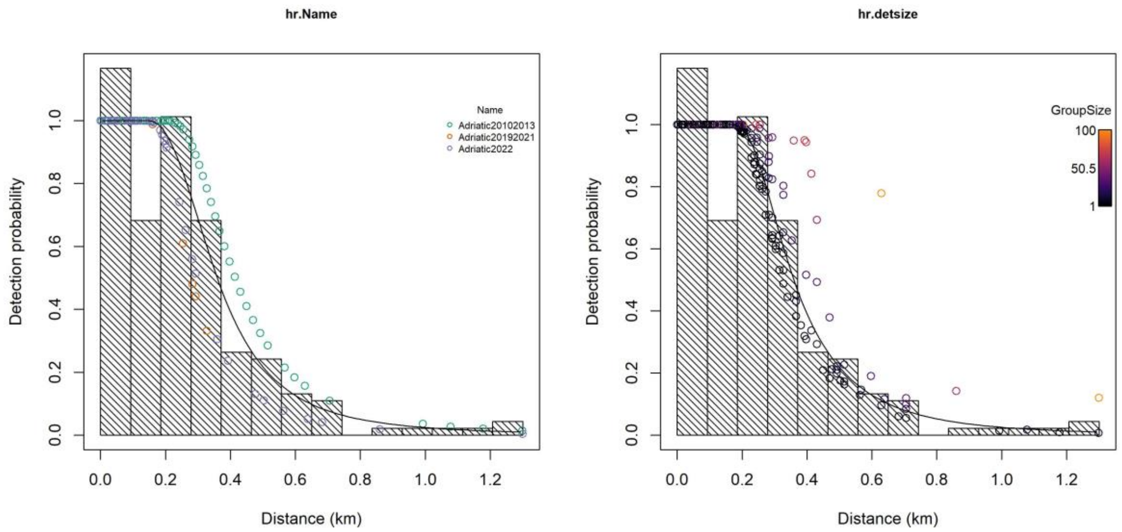


Figure C-51. Detection functions of the individual covariates.

1.9.3. Bottlenose dolphin

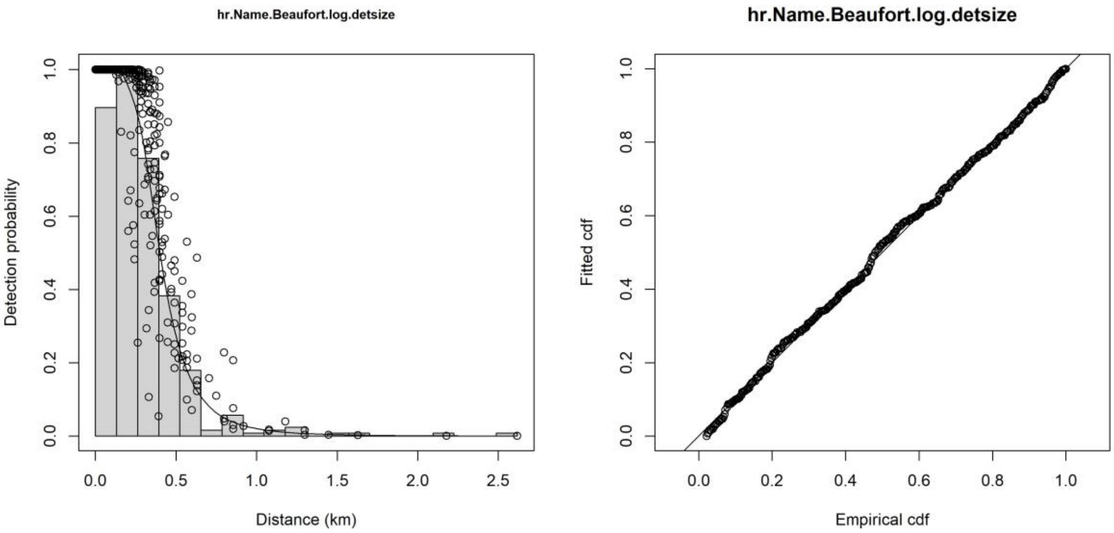


Figure C-52. Plot of the detection function (left) and QQ-Plot (right).

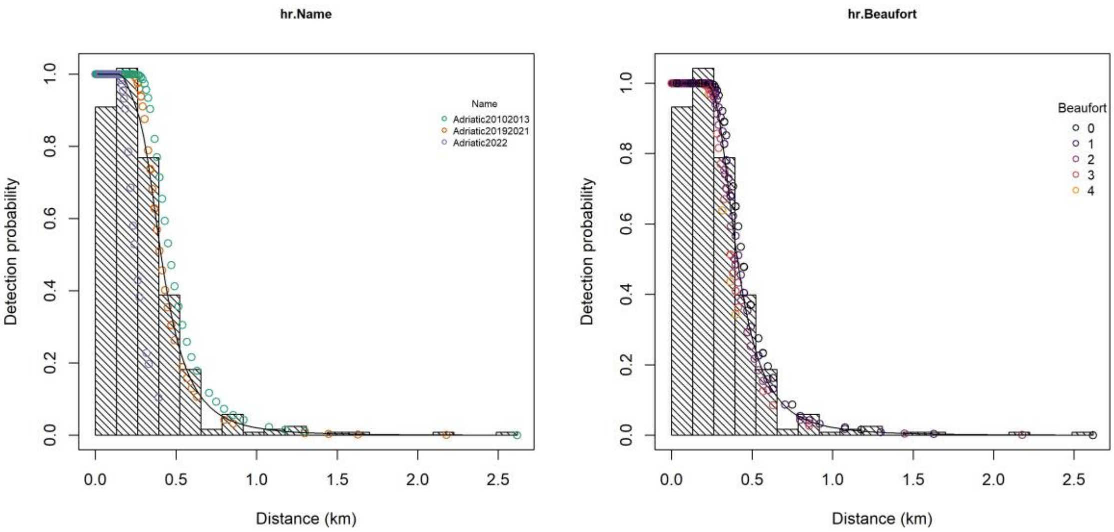


Figure C-53. Detection functions of the individual covariates.

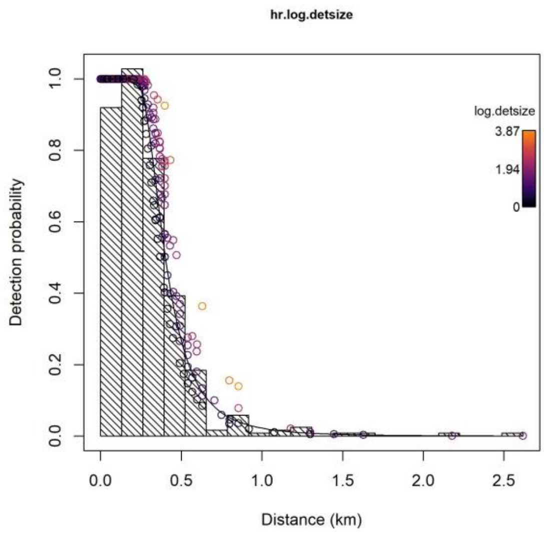


Figure C-54. Detection functions of the individual covariates.

1.9.4. Bottlenose dolphin - Risso's dolphin

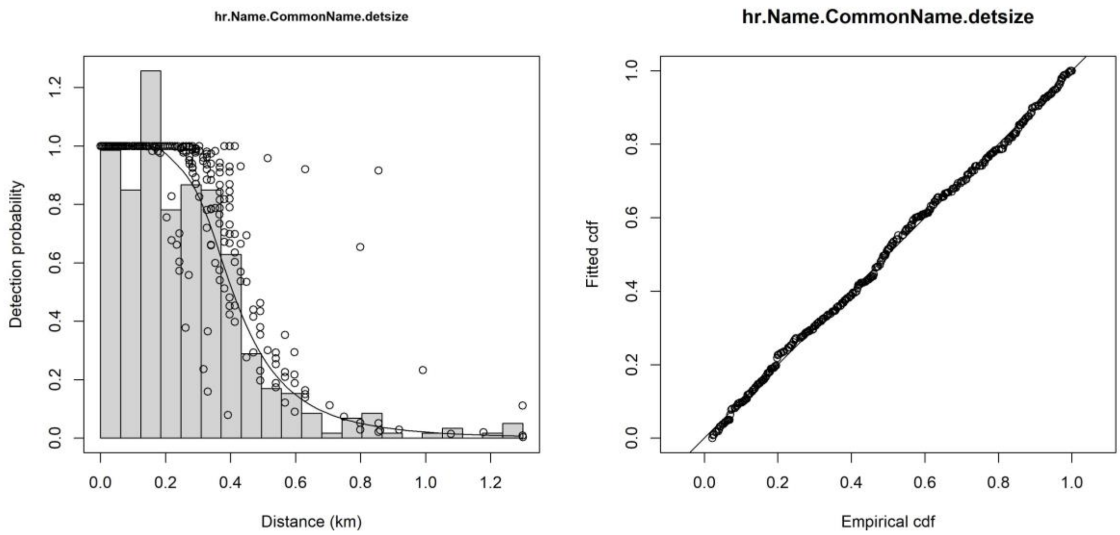


Figure C-55. Plot of the detection function (left) and QQ-Plot (right).

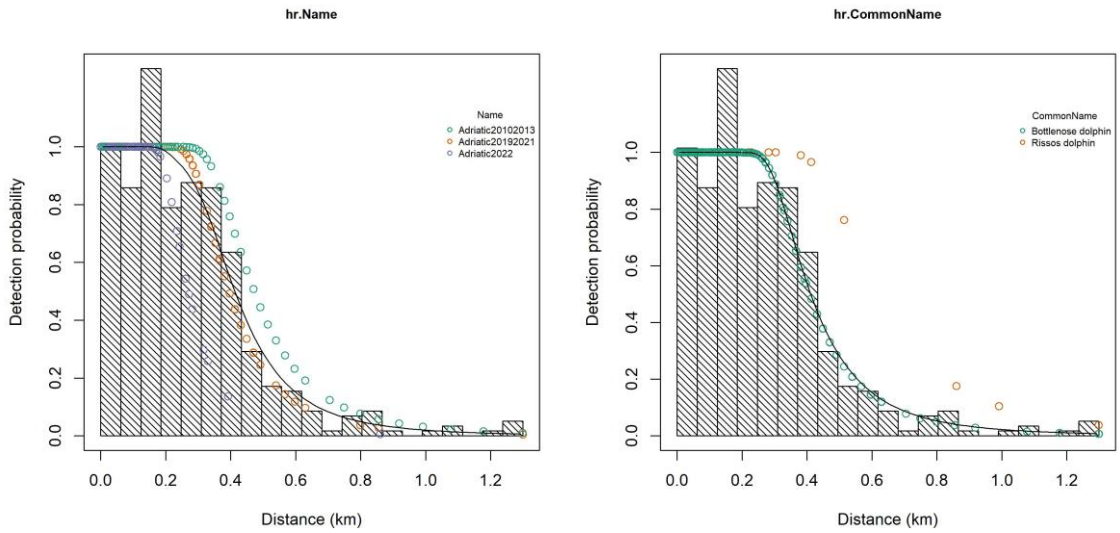


Figure C-56. Detection functions of the individual covariates.

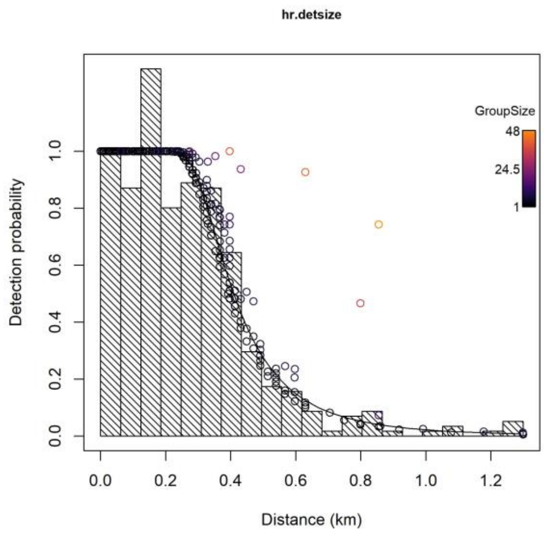


Figure C-57. Detection functions of the individual covariates.

1.10. Platform Group 229 - B

1.10.1. Fin whale

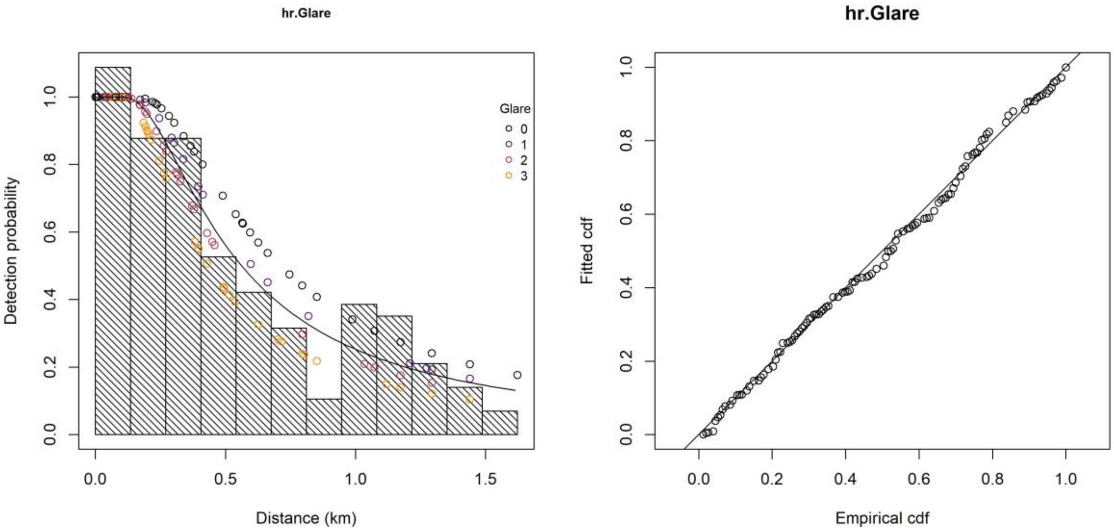


Figure C-58. Plot of the detection function (left) and QQ-Plot (right).

1.10.2. Common dolphin

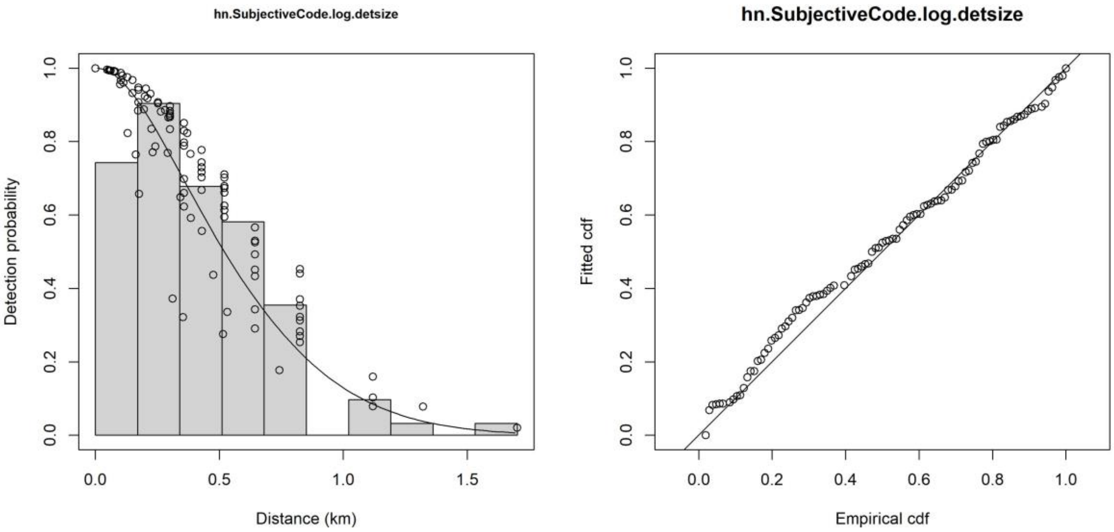


Figure C-59. Plot of the detection function (left) and QQ-Plot (right).

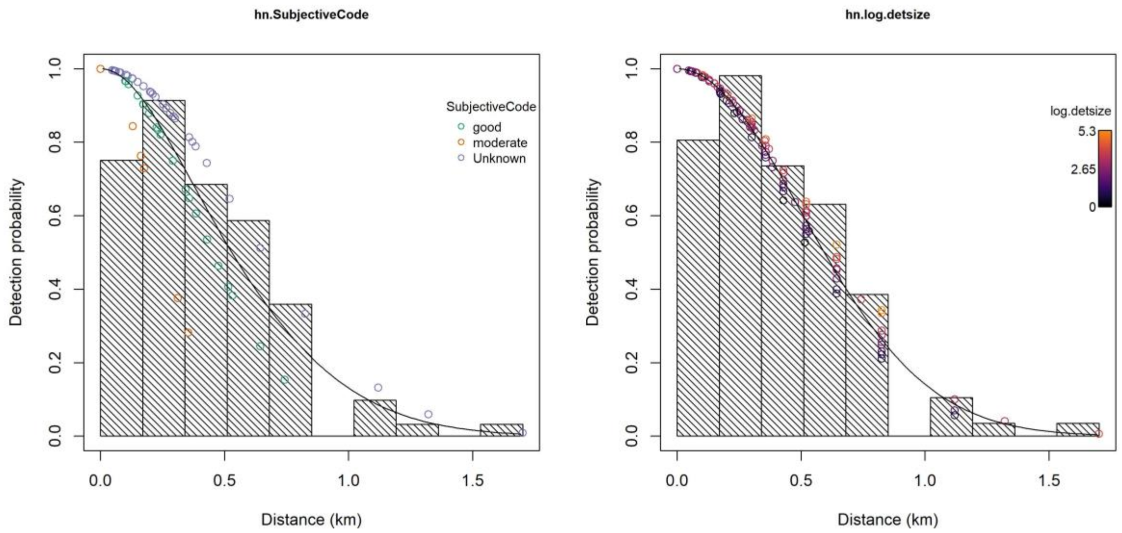


Figure C-60. Detection functions of the individual covariates.

1.10.3. Risso's dolphin

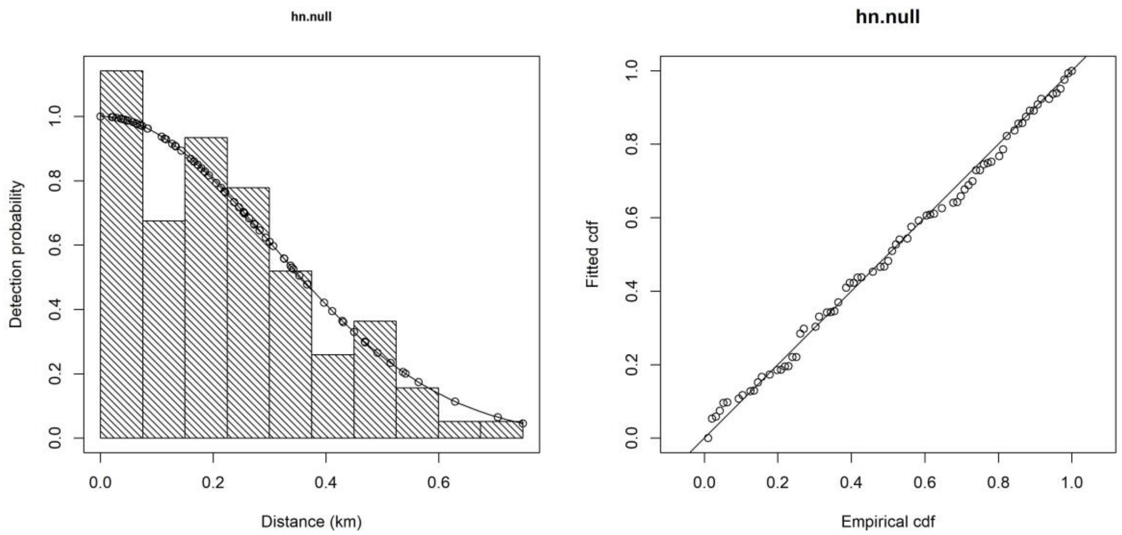


Figure C-61. Plot of the detection function (left) and QQ-Plot (right).

1.10.4. Striped dolphin

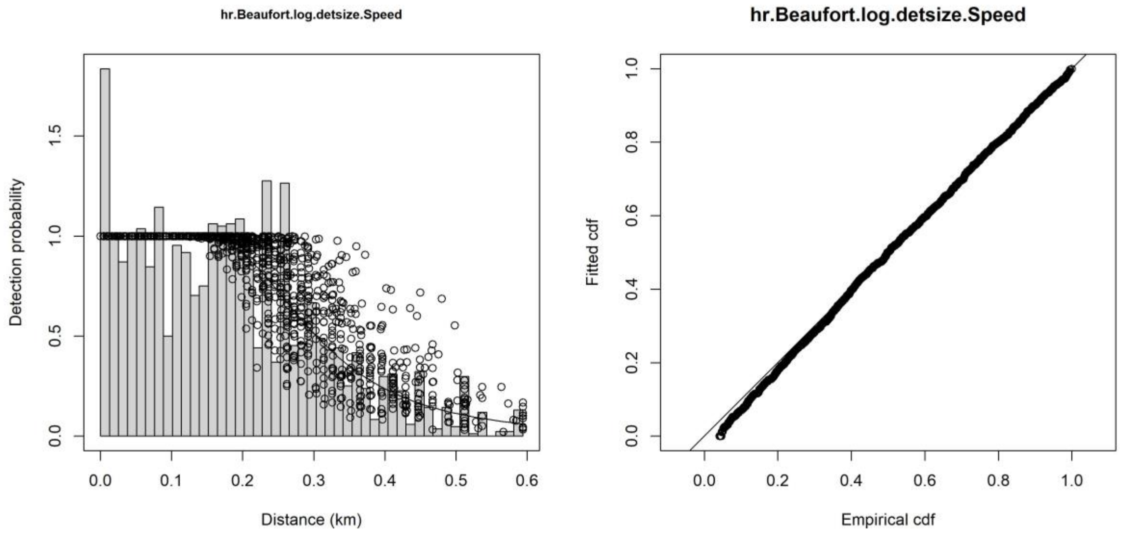


Figure C-62. Plot of the detection function (left) and QQ-Plot (right).

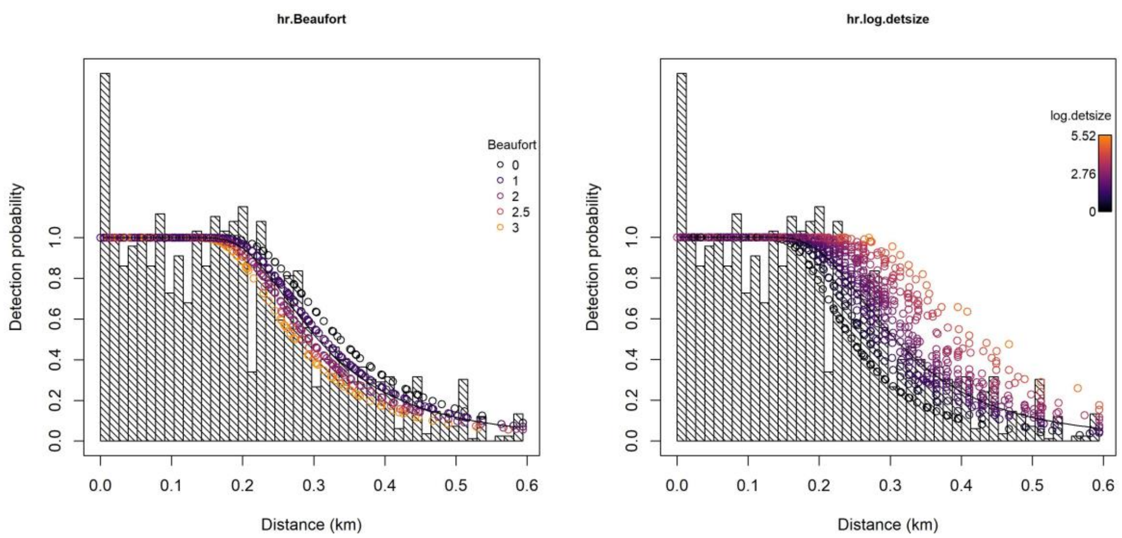


Figure C-63. Detection functions of the individual covariates.

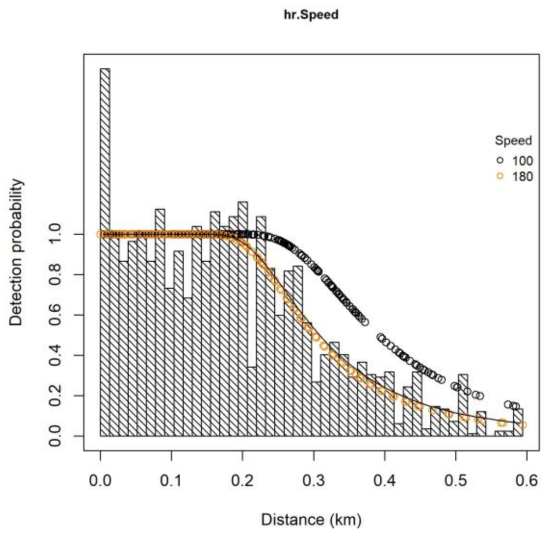


Figure C-64. Detection functions of the individual covariates.

1.10.5. Bottlenose dolphin

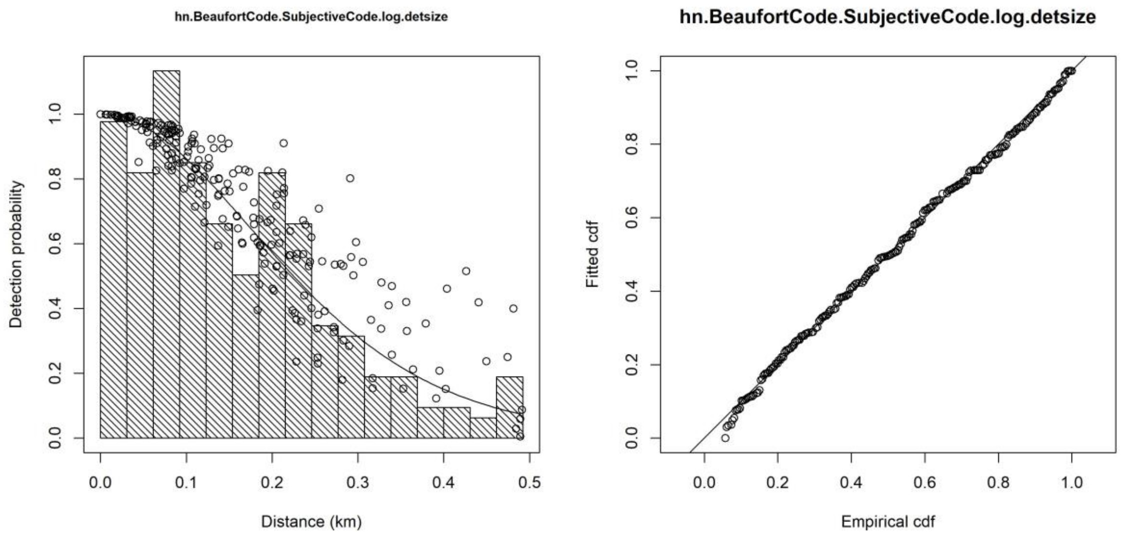


Figure C-65. Plot of the detection function (left) and QQ-Plot (right).

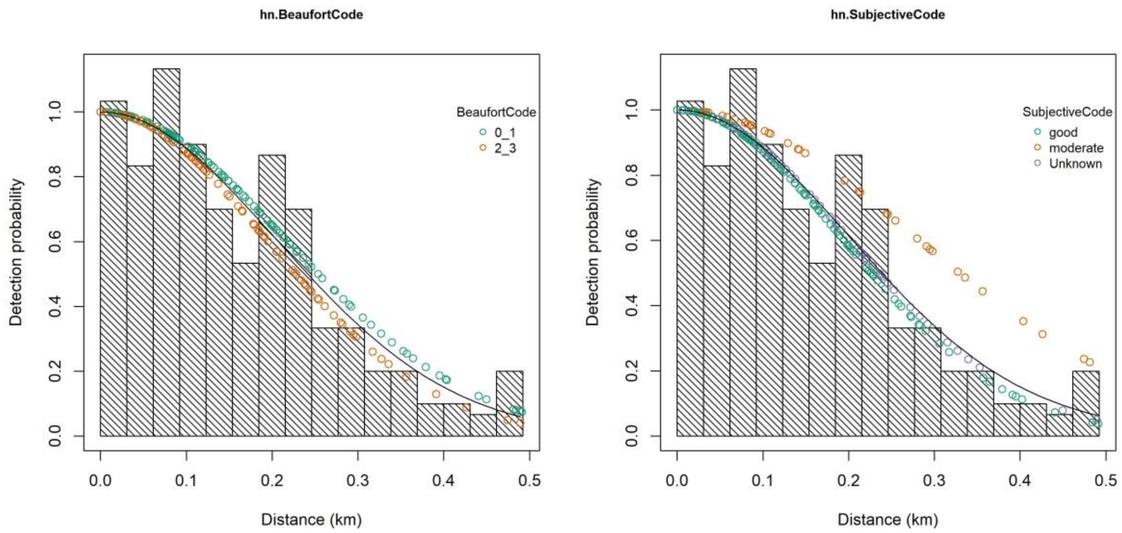


Figure C-66. Detection functions of the individual covariates.

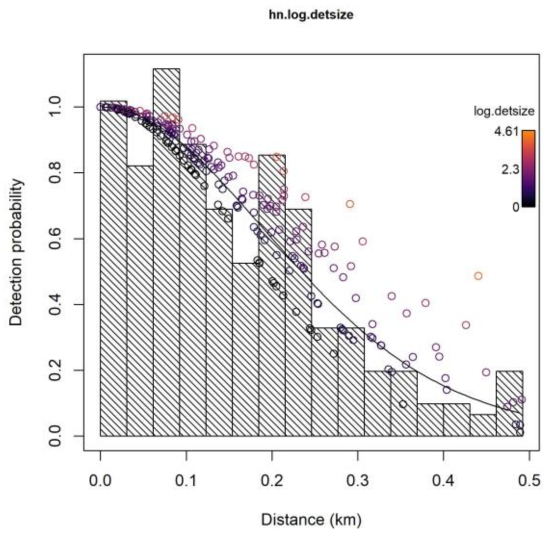


Figure C-67. Detection functions of the individual covariates.

1.10.6. Unidentified dolphin

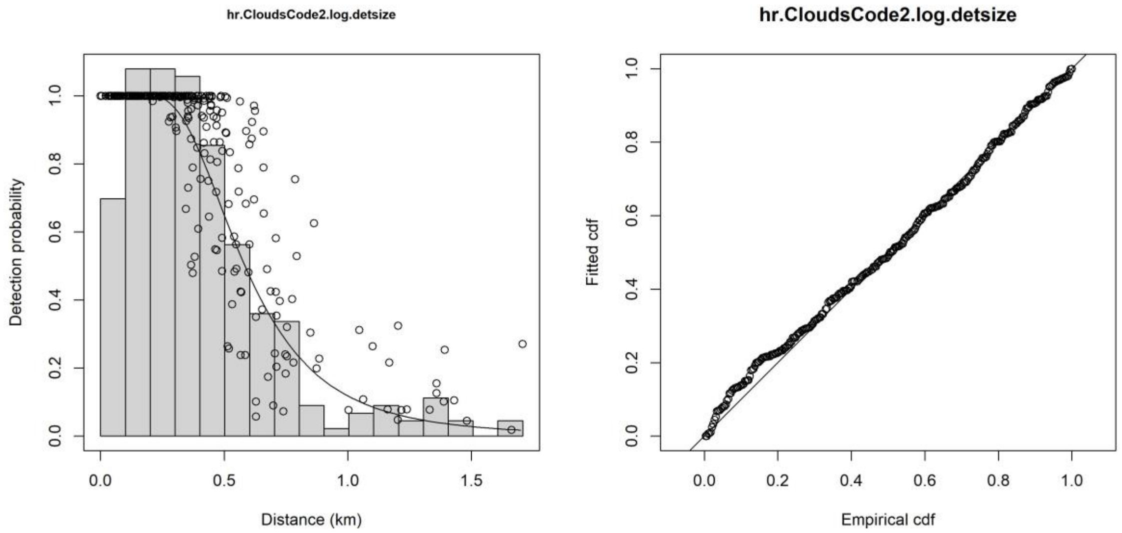


Figure C-68. Plot of the detection function (left) and QQ-Plot (right).

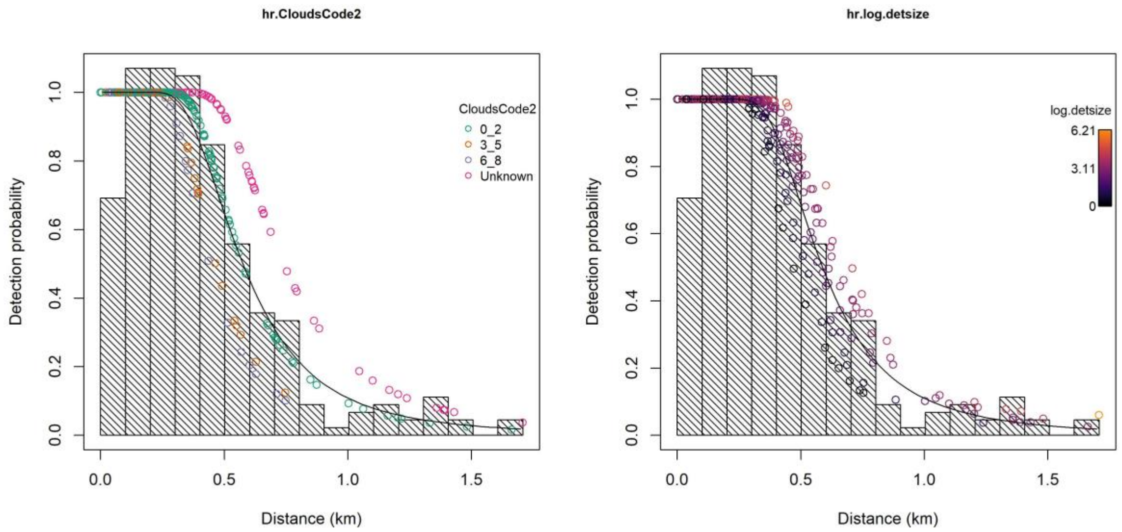


Figure C-69. Detection functions of the individual covariates.

1.10.7. Unidentified small dolphin

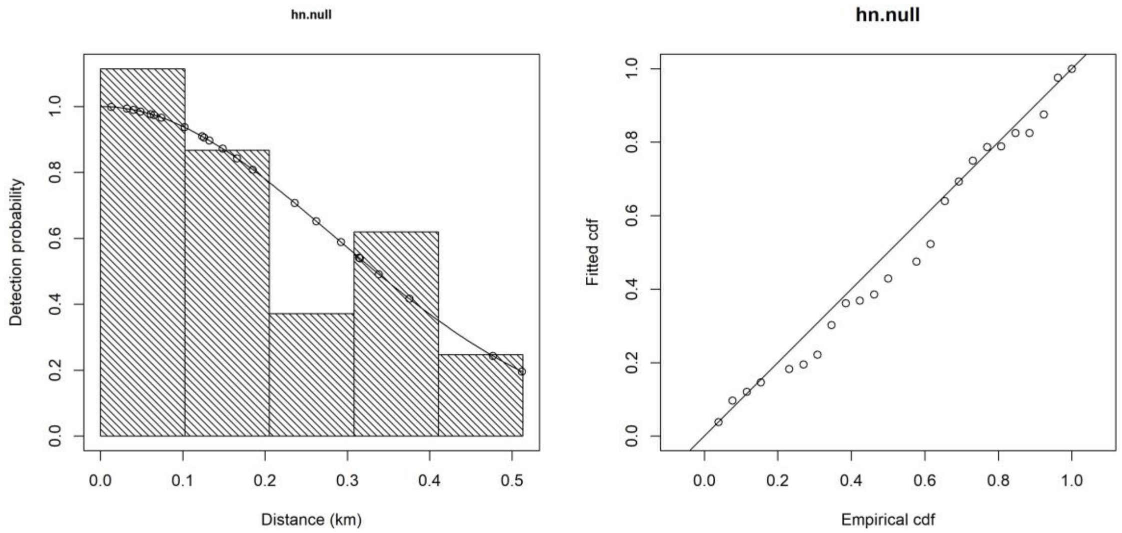


Figure C-70. Plot of the detection function (left) and QQ-Plot (right).

1.11. Platform Group 229 - F

1.11.1. Fin whale

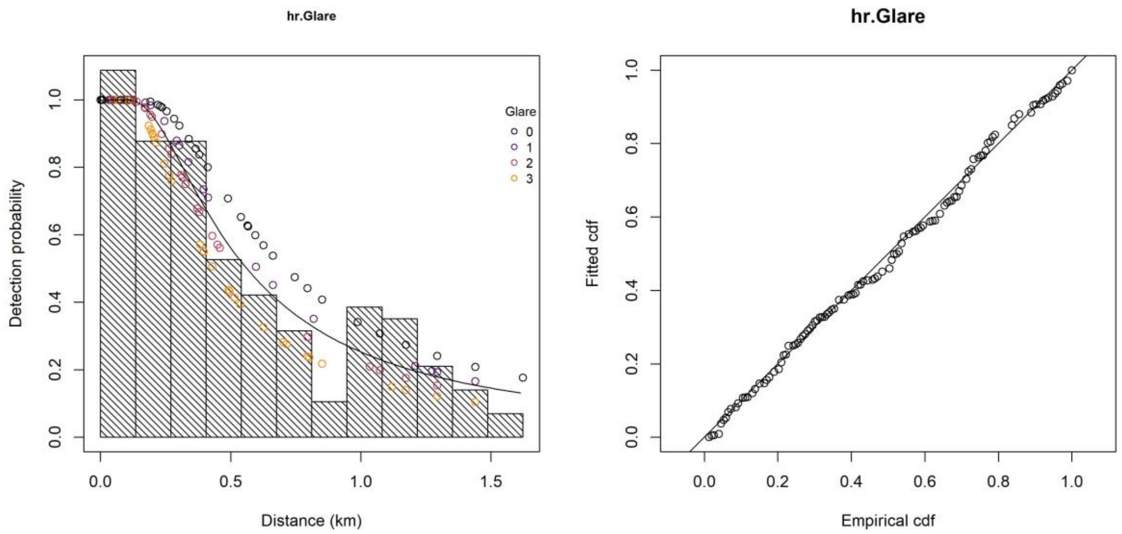


Figure C-71. Plot of the detection function (left) and QQ-Plot (right).

1.11.2. Striped dolphin

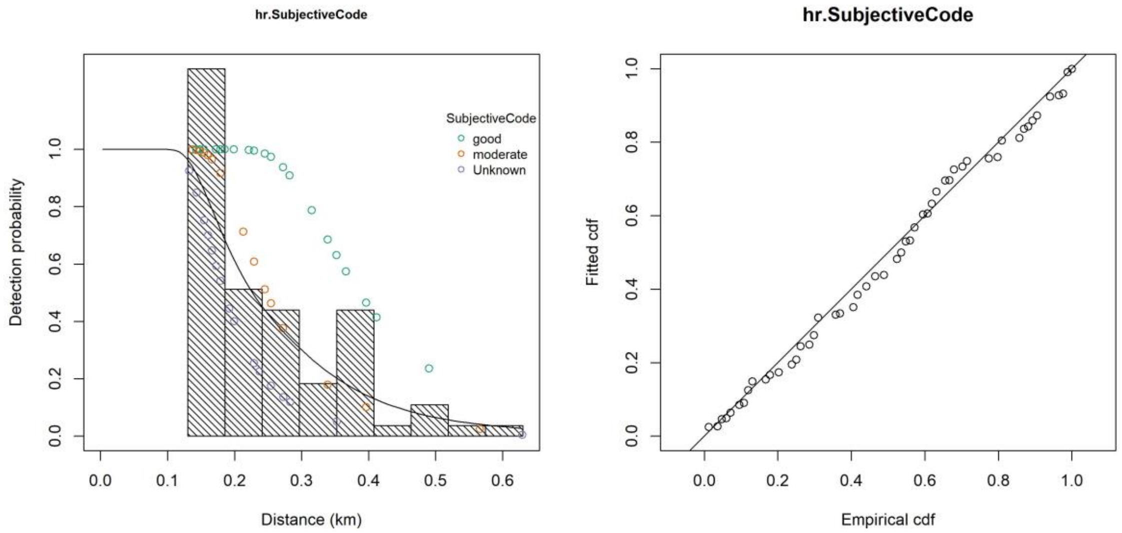


Figure C-72. Plot of the detection function (left) and QQ-Plot (right).

2. Detection functions for ships

2.1. Platform Group G1 - G2 - G3 - G10 - G11 - None

2.1.1. Sperm whale

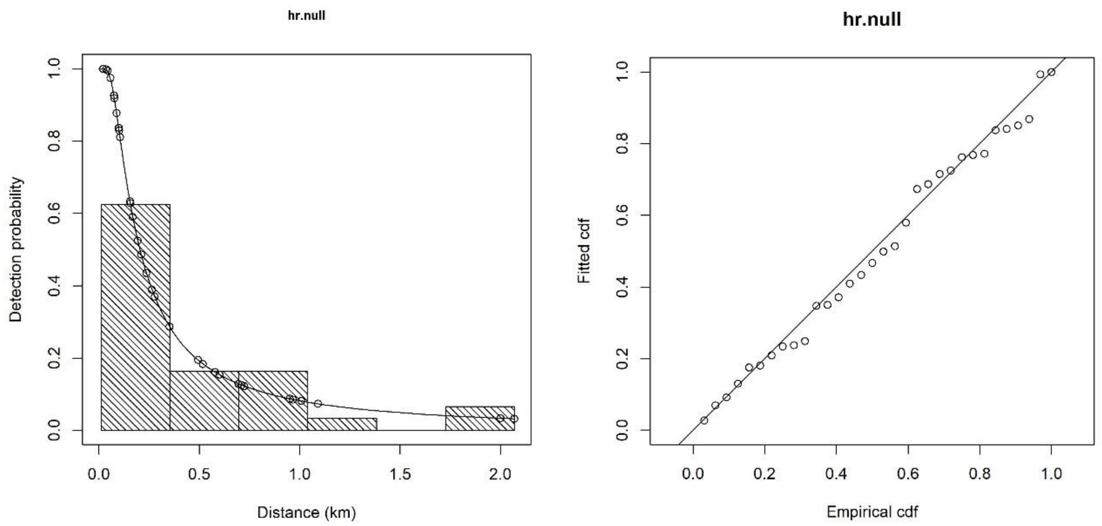


Figure C-73. Plot of the detection function (left) and QQ-Plot (right).

2.2. Platform Group G1 - G2 - G3 - G8 - G10 - None

2.2.1. Fin whale

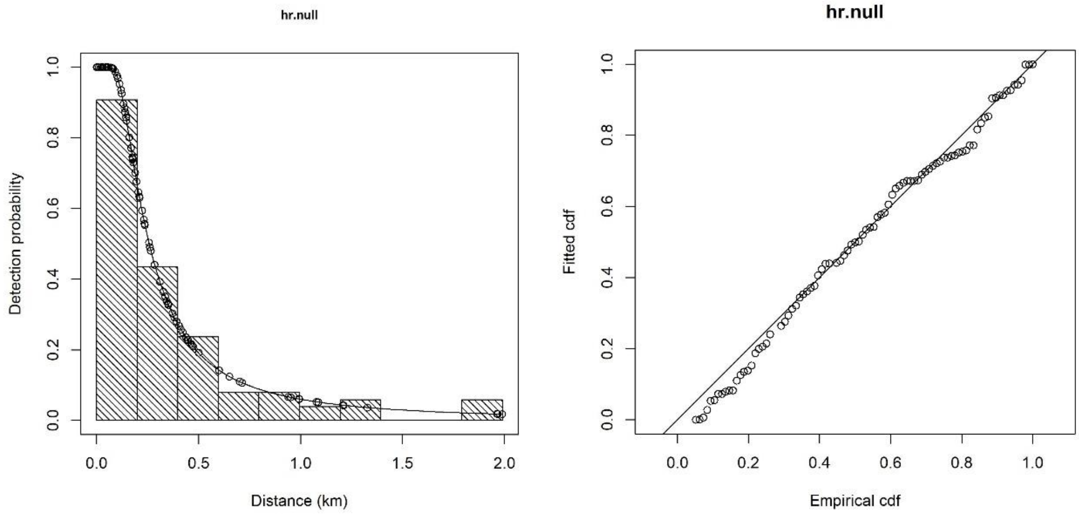


Figure C-74. Plot of the detection function (left) and QQ-Plot (right).

2.3. Platform Group G1 - G2 - G4 - G5 - G6 - G8 - None

2.3.1. Bottlenose dolphin

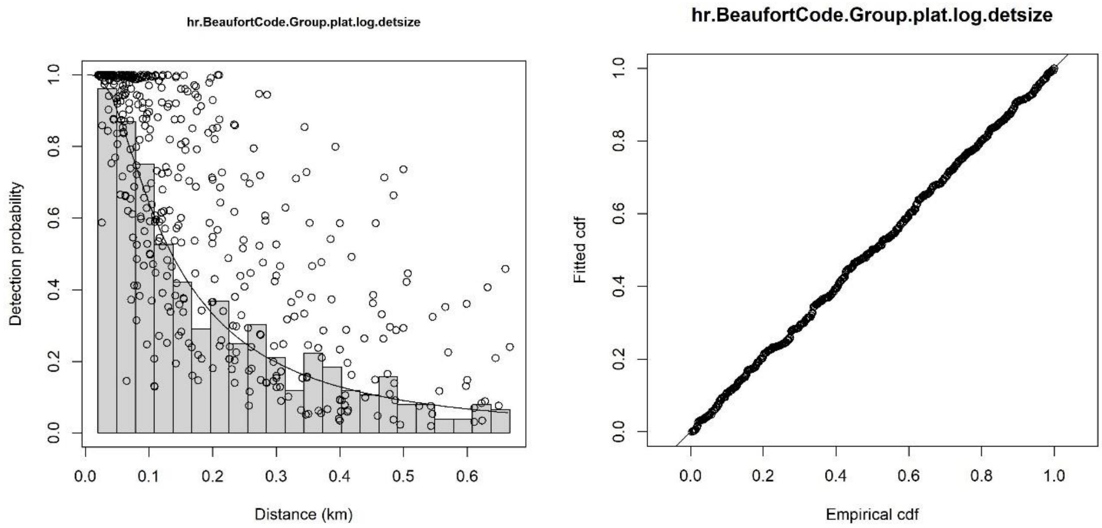


Figure C-75. Plot of the detection function (left) and QQ-Plot (right).

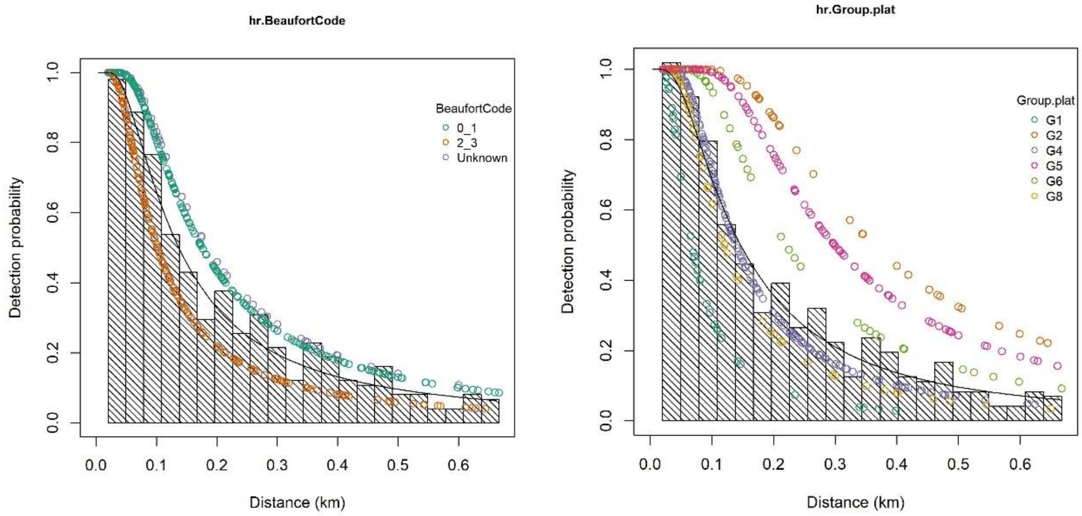


Figure C-76. Detection functions of the individual covariates.

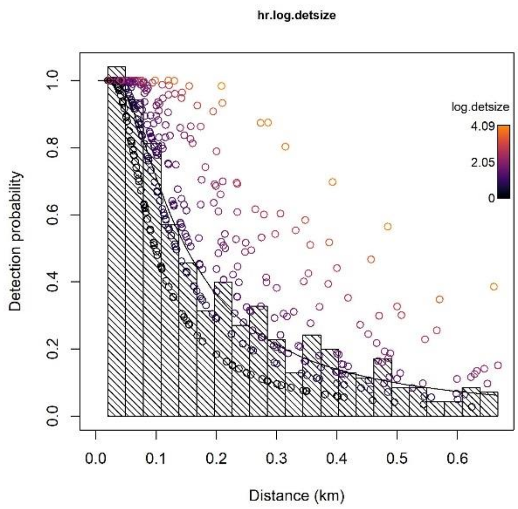


Figure C-77. Detection functions of the individual covariates.

2.4. Platform Group G1 - G2 - None

2.4.1. Harbor porpoise

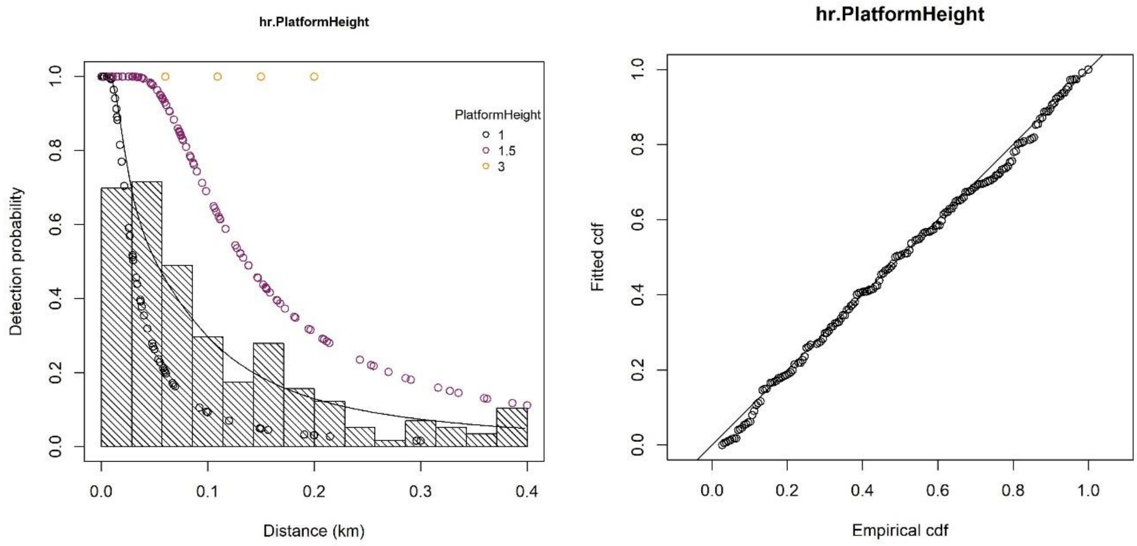


Figure C-78. Plot of the detection function (left) and QQ-Plot (right).

2.4.2. Common dolphin

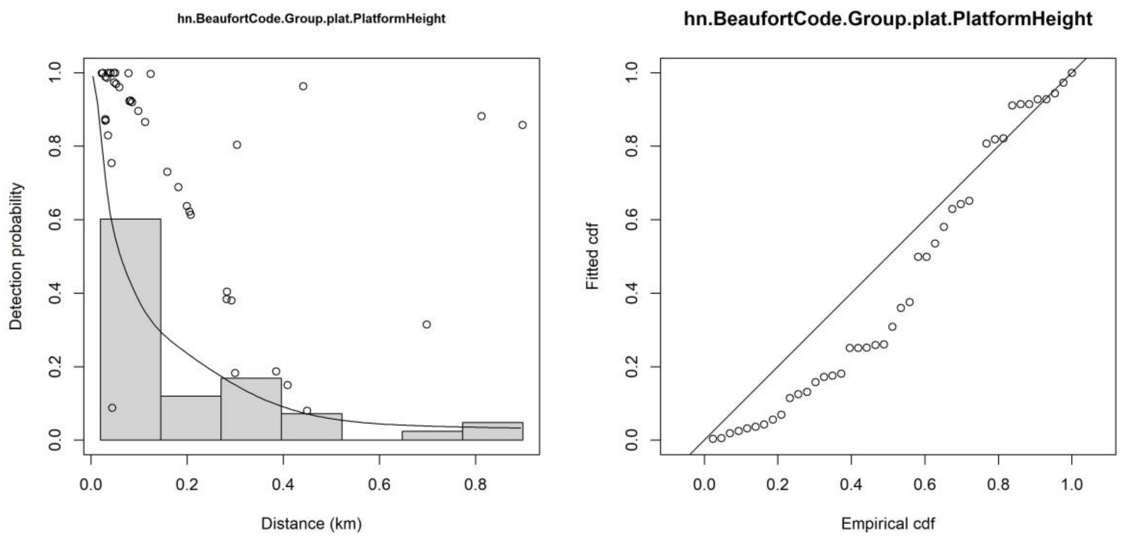


Figure C-79. Plot of the detection function (left) and QQ-Plot (right).

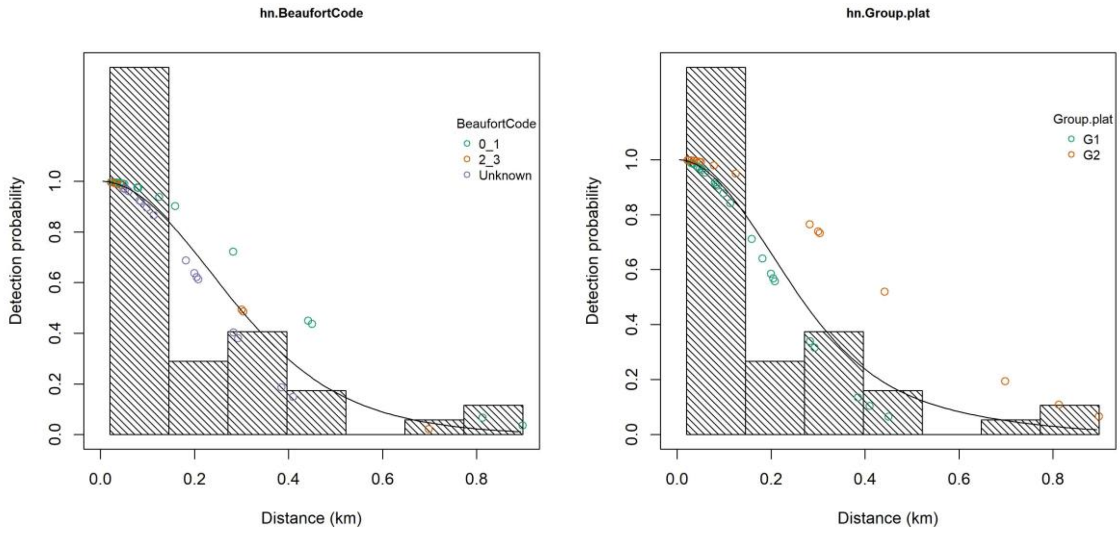


Figure C-80. Detection functions of the individual covariates.

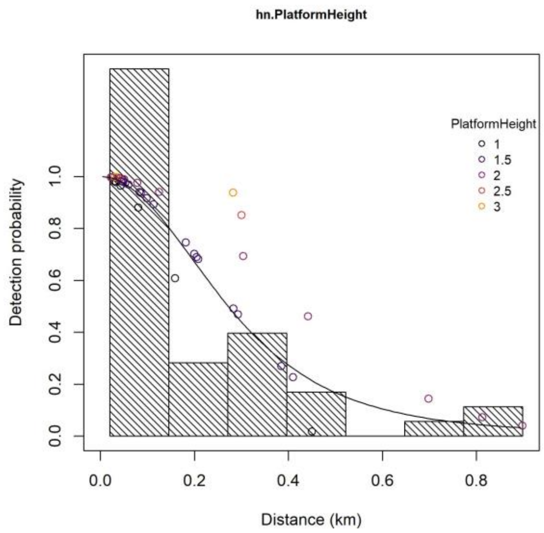


Figure C-81. Detection functions of the individual covariates.

2.4.3. Striped dolphin - Common dolphin

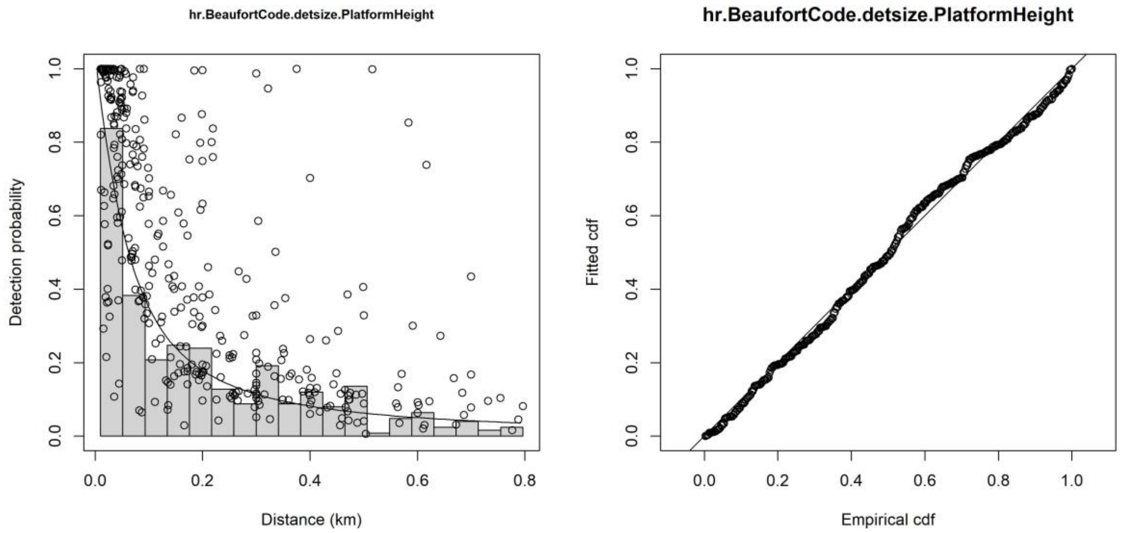


Figure C-82. Plot of the detection function (left) and QQ-Plot (right).

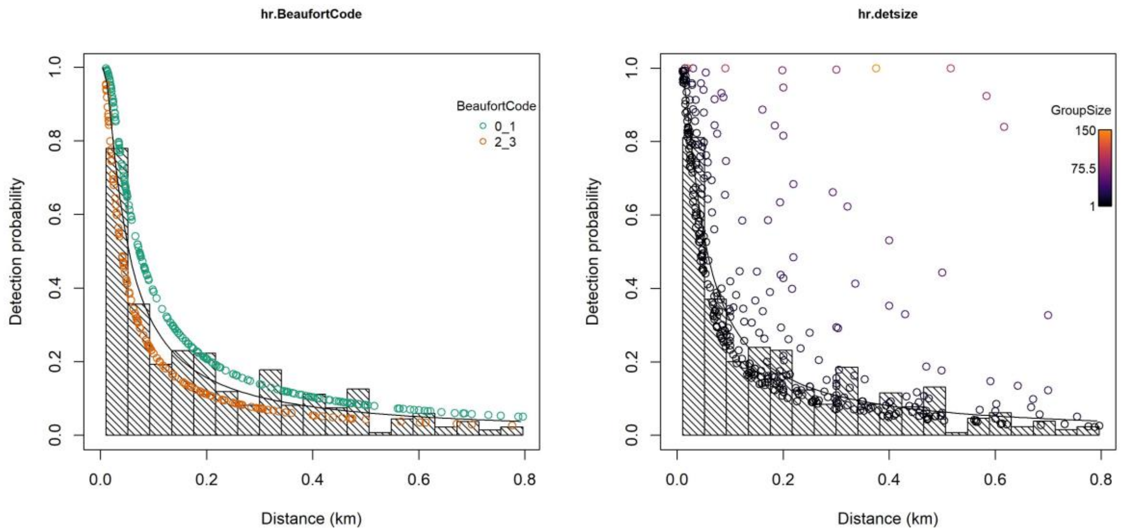


Figure C-83. Detection functions of the individual covariates.

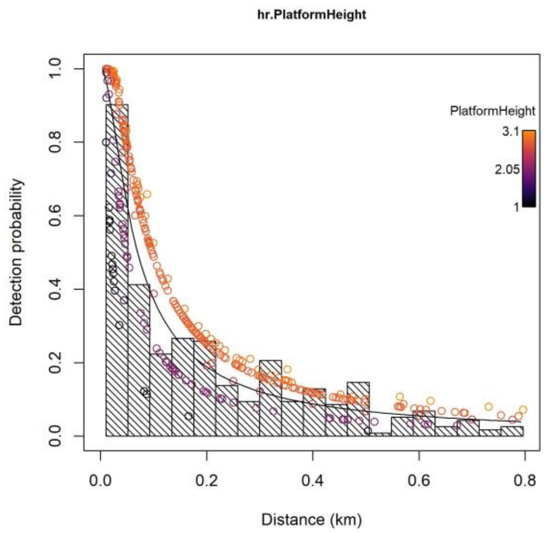


Figure C-84. Detection functions of the individual covariates.

2.5. Platform Group G1 - None

2.5.1. Harbor porpoise

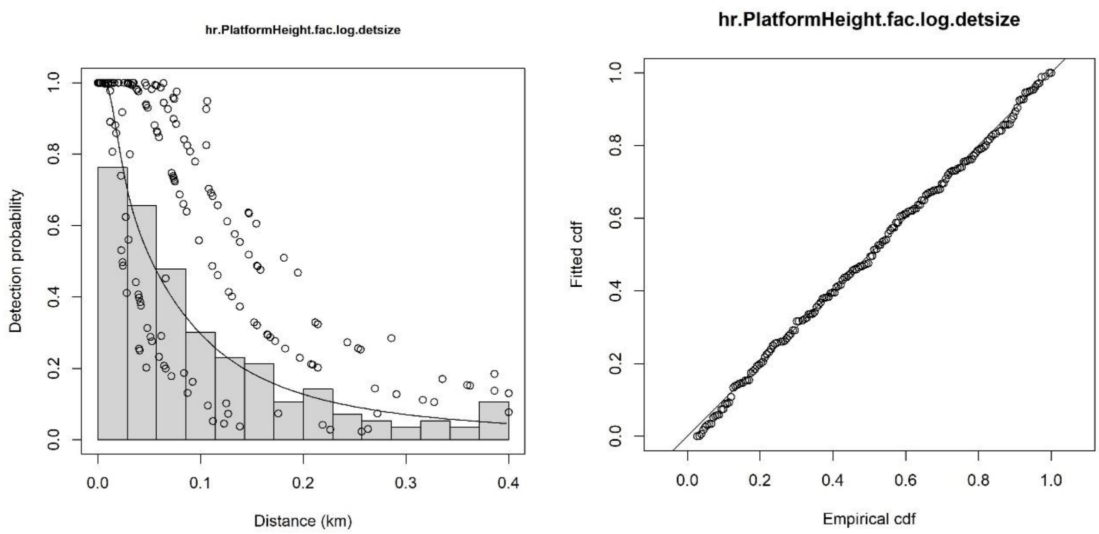


Figure C-85. Plot of the detection function (left) and QQ-Plot (right).

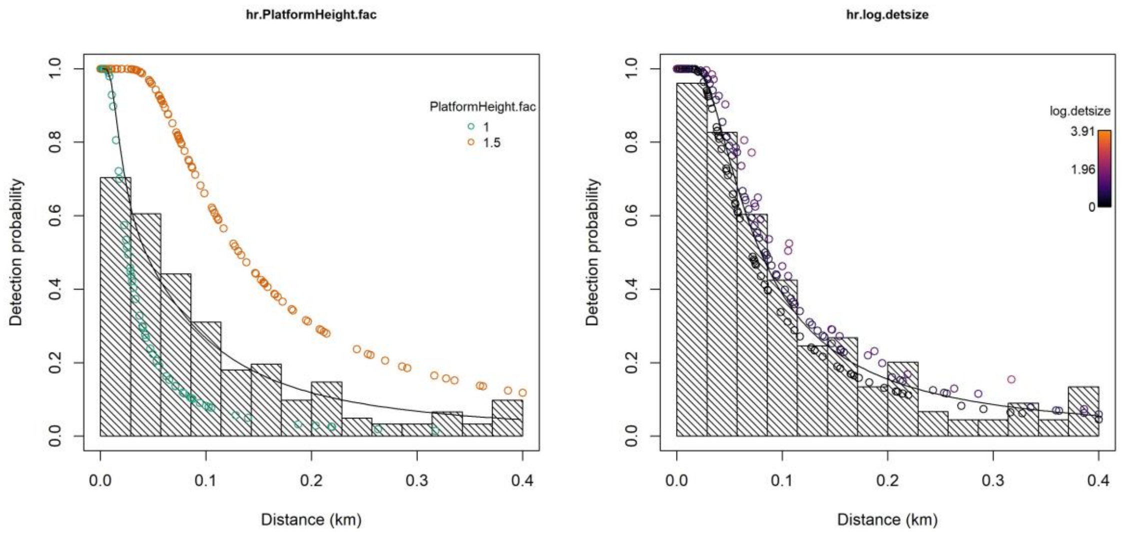


Figure C-86. Detection functions of the individual covariates.

2.5.2. Bottlenose dolphin

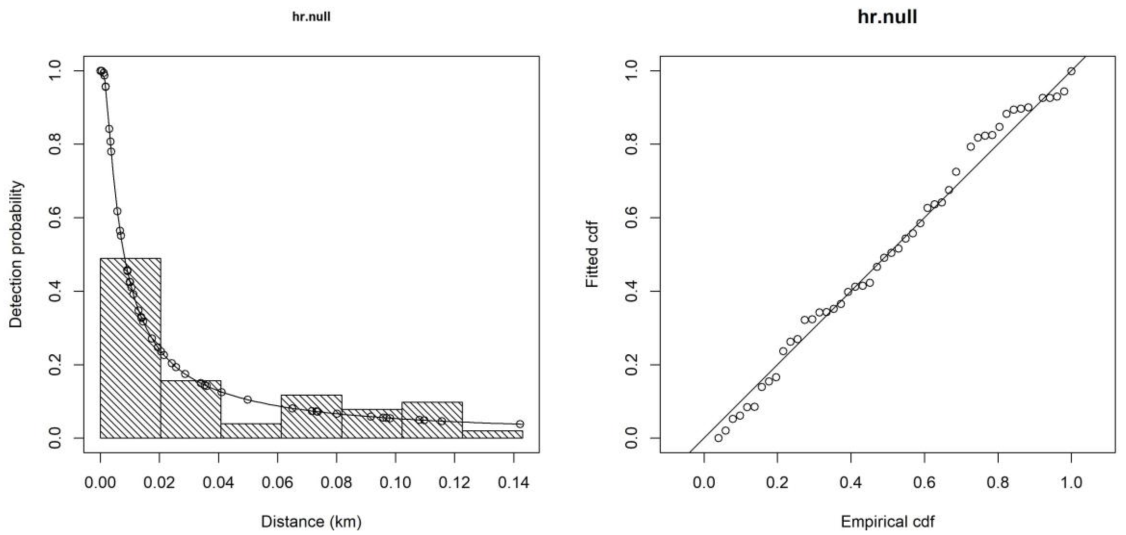


Figure C-87. Plot of the detection function (left) and QQ-Plot (right).

2.5.3. Cuvier's beaked whale

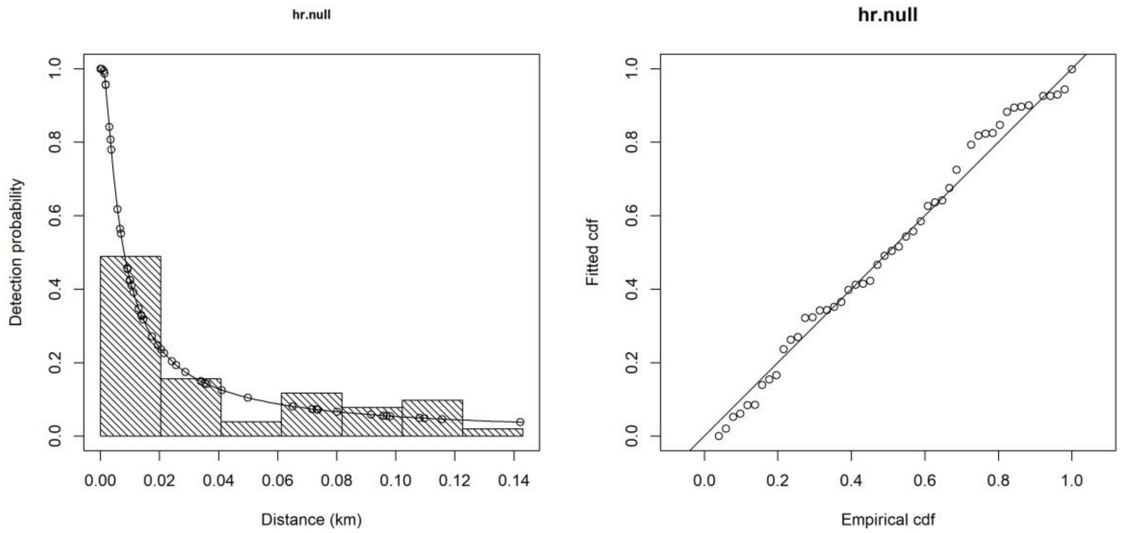


Figure C-88. Plot of the detection function (left) and QQ-Plot (right).

2.5.4. Unidentified beaked whale

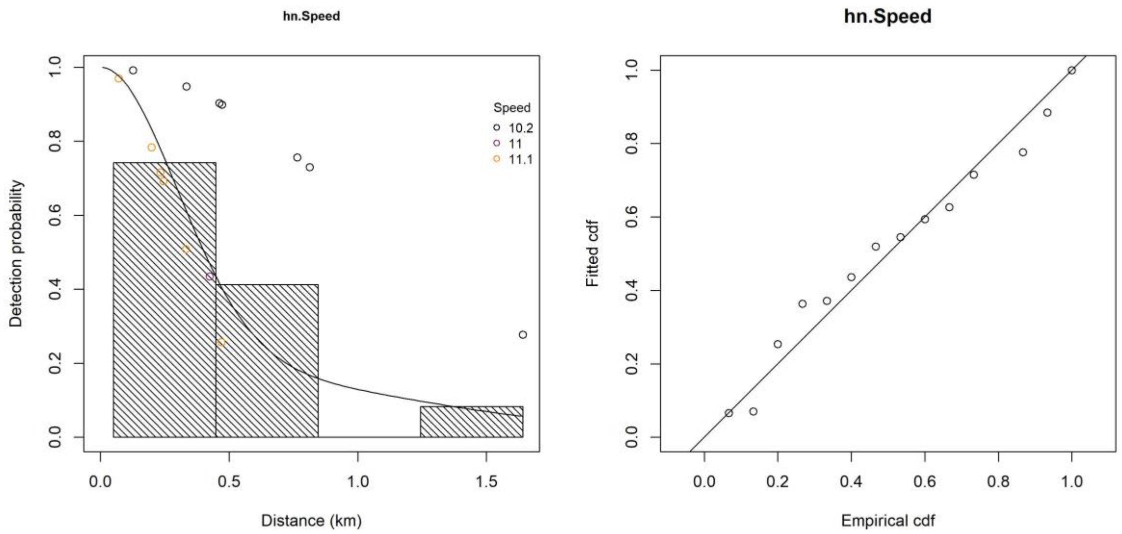


Figure C-89. Plot of the detection function (left) and QQ-Plot (right).

2.6. Platform Group G10 - 10_11

2.6.1. Bottlenose dolphin - Common dolphin - Striped dolphin - Unidentified dolphin

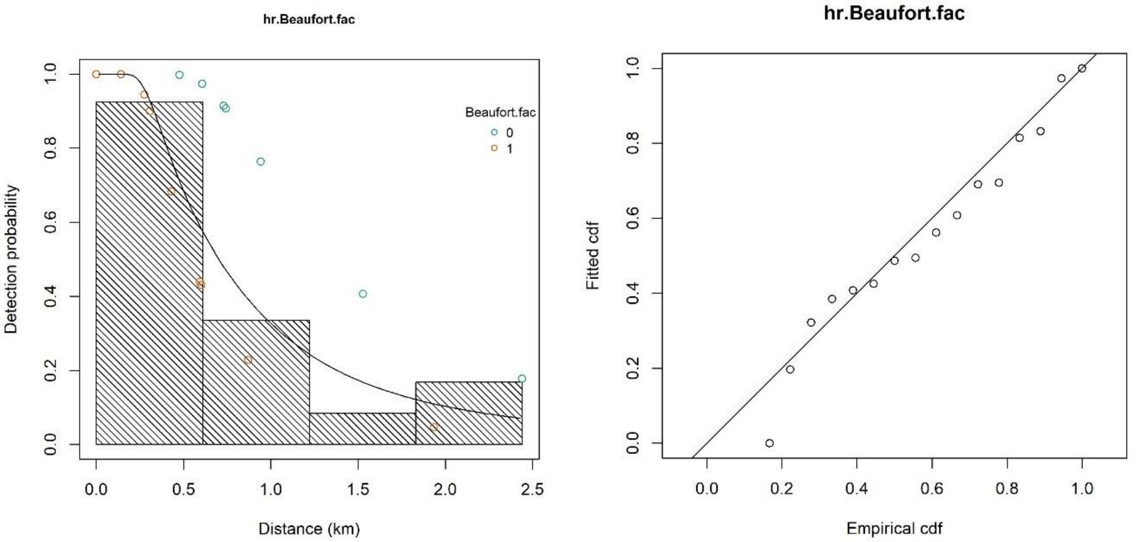


Figure C-90. Plot of the detection function (left) and QQ-Plot (right).

2.6.2. Fin whale

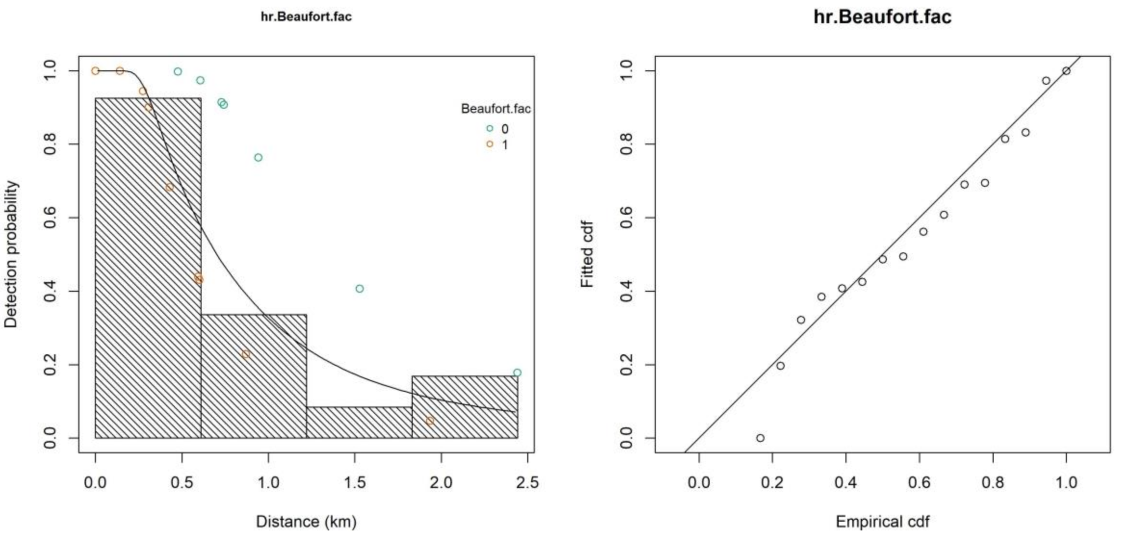


Figure C-91. Plot of the detection function (left) and QQ-Plot (right).

2.7. Platform Group G10 - All

2.7.1. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

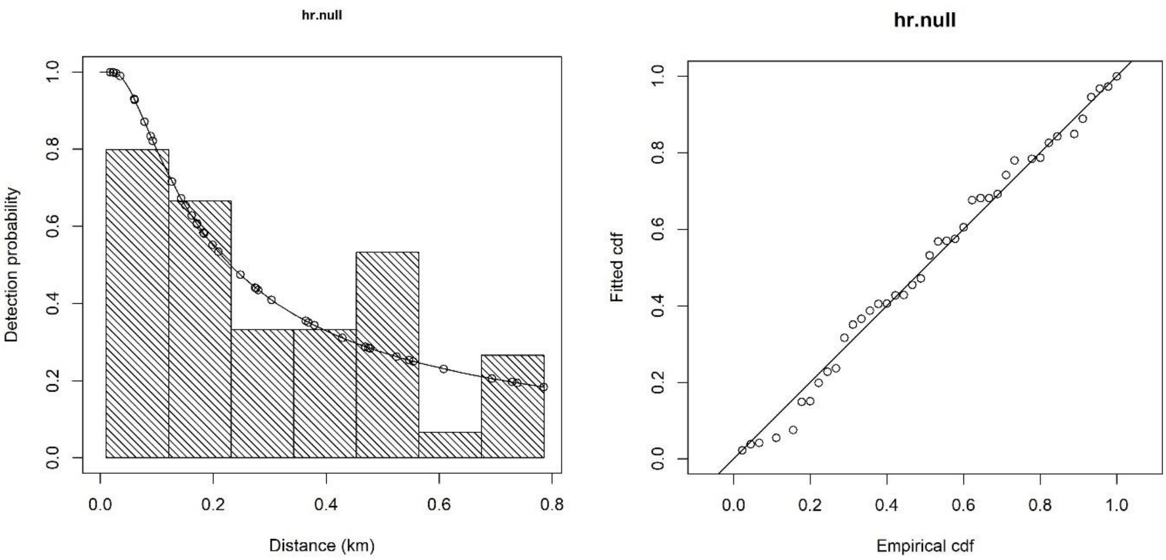


Figure C-92. Plot of the detection function (left) and QQ-Plot (right).

2.8. Platform Group G10 - G11 - All

2.8.1. Cuvier's beaked whale

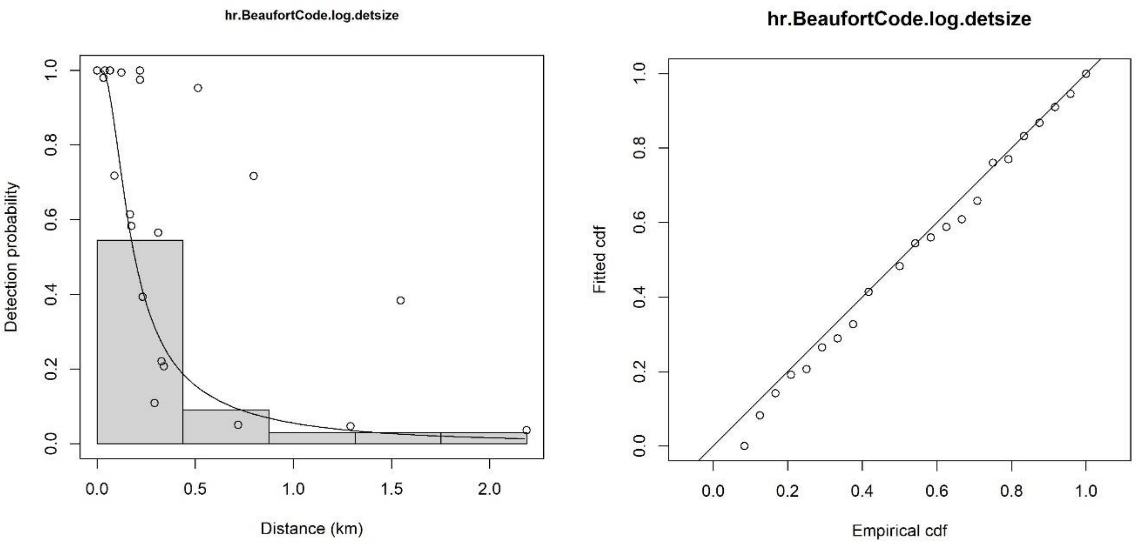


Figure C-93. Plot of the detection function (left) and QQ-Plot (right).

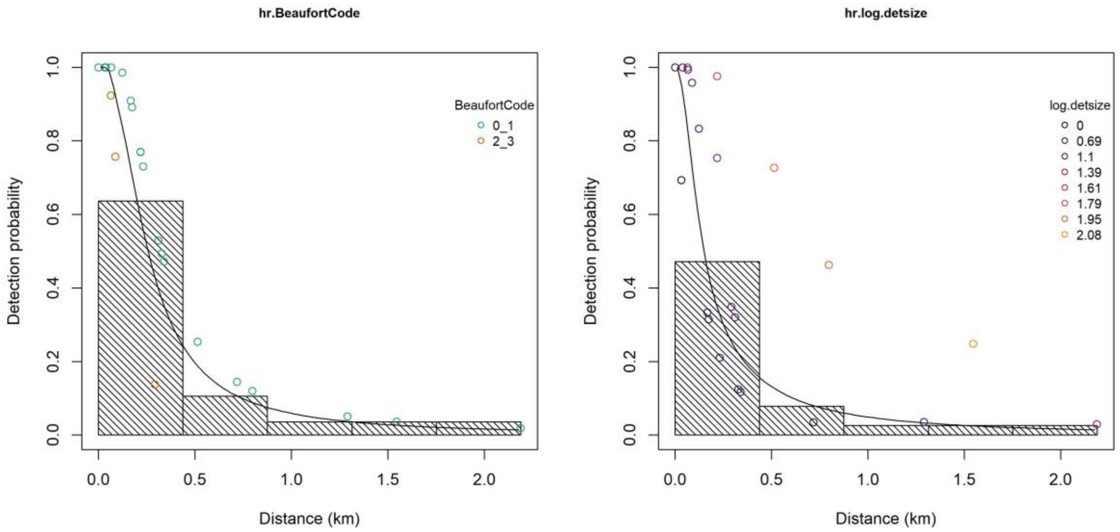


Figure C-94. Detection functions of the individual covariates.

2.9. Platform Group G10 - None

2.9.1. Common dolphin

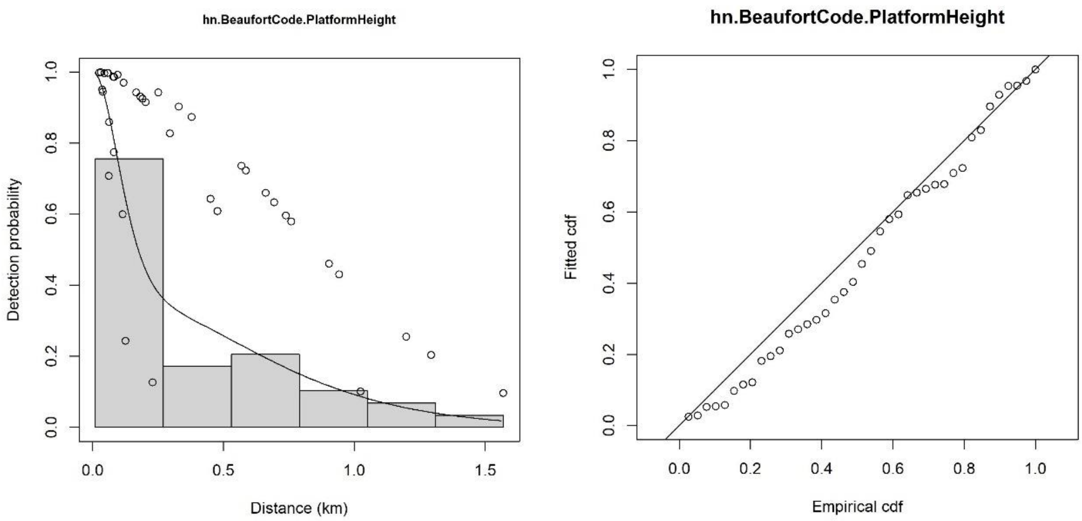


Figure C-95. Plot of the detection function (left) and QQ-Plot (right).

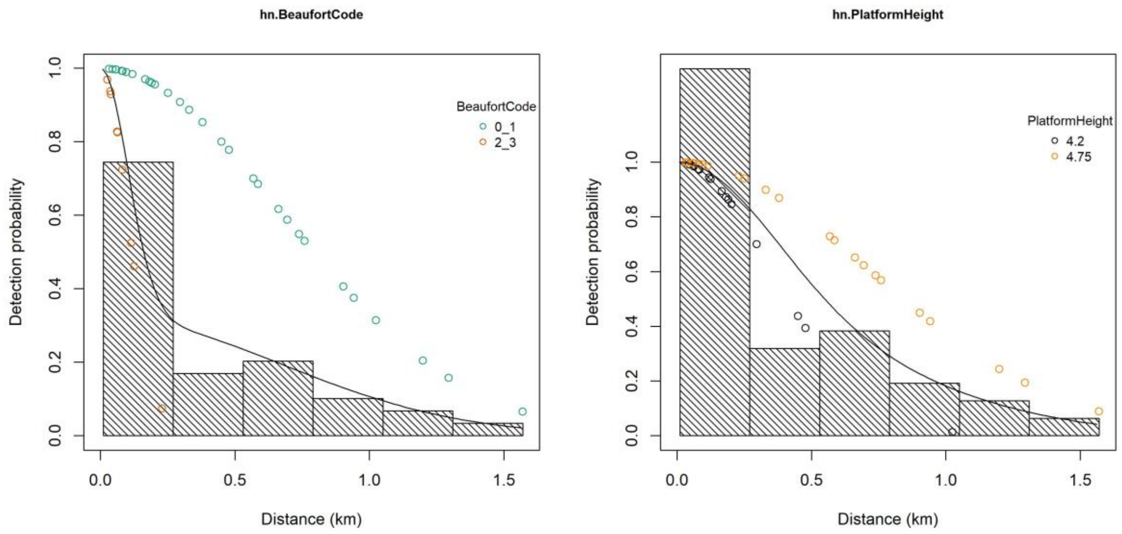


Figure C-96. Detection functions of the individual covariates.

2.9.2. Harbor porpoise

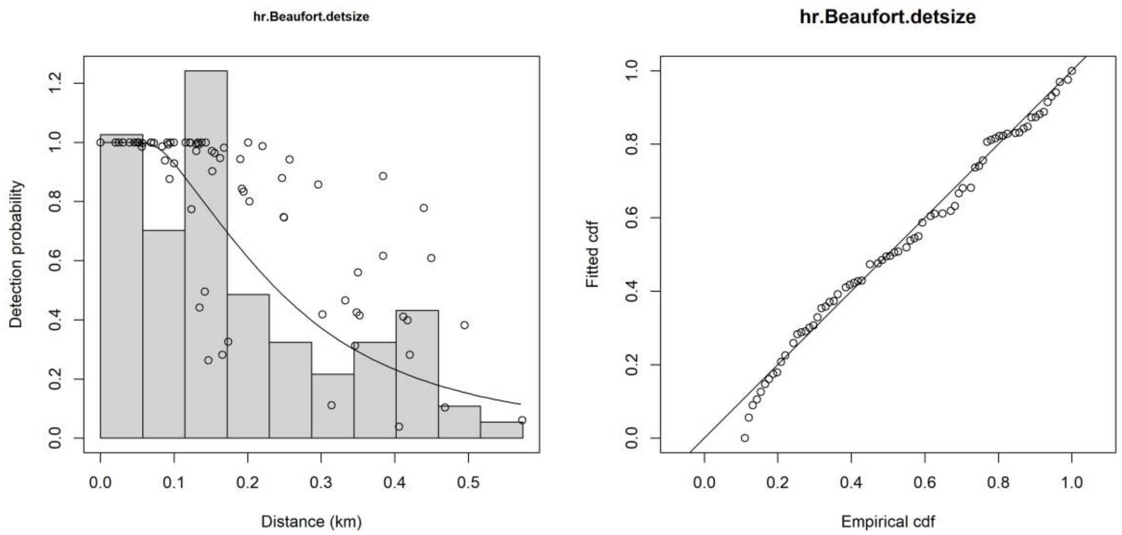


Figure C-97. Plot of the detection function (left) and QQ-Plot (right).

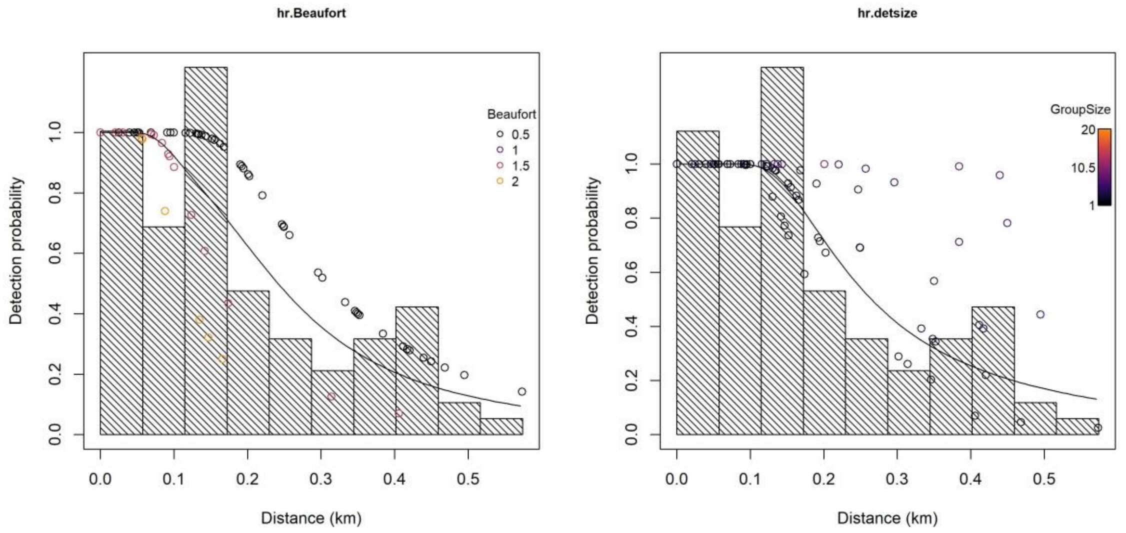


Figure C-98. Detection functions of the individual covariates.

2.9.3. Striped dolphin

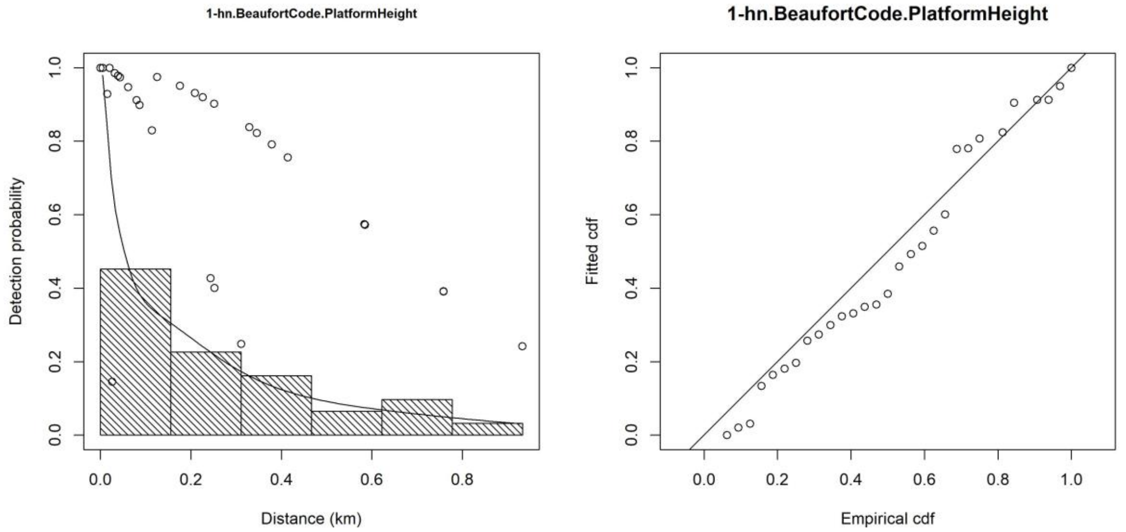


Figure C-99. Plot of the detection function (left) and QQ-Plot (right).

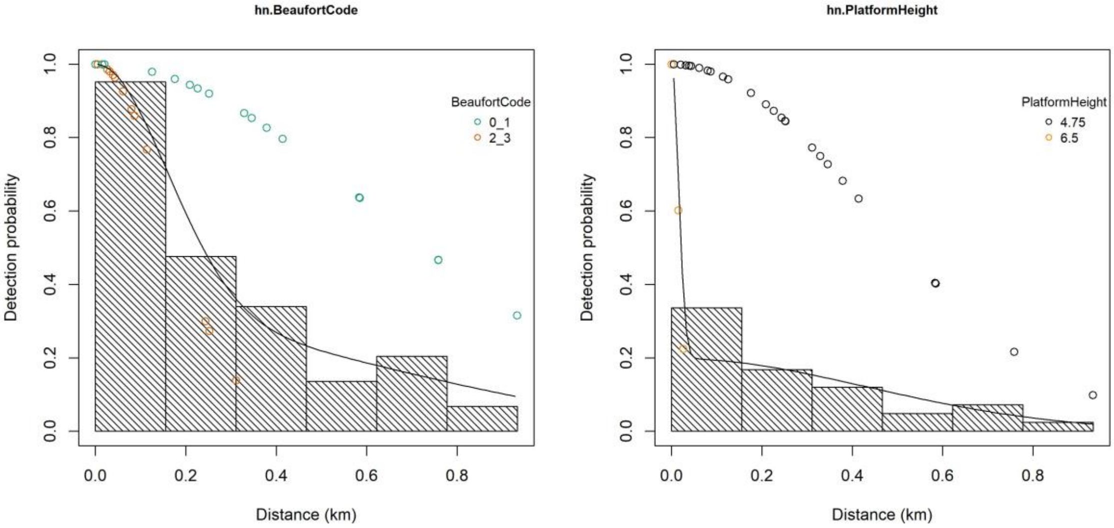


Figure C-100. Detection functions of the individual covariates.

2.9.4. Striped dolphin - Common dolphin - Hybrid Dde-Sco - Unidentified small dolphin

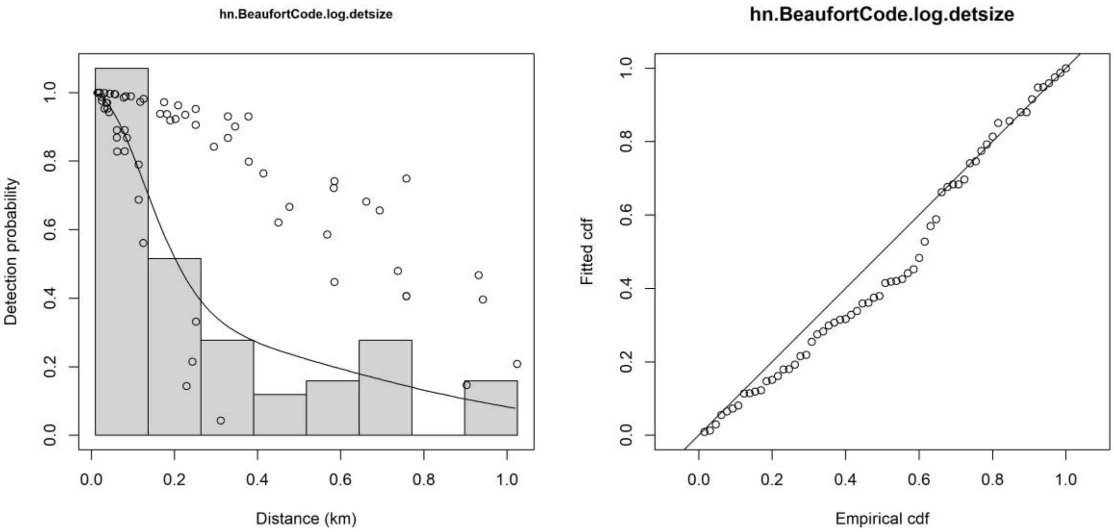


Figure C-101. Plot of the detection function (left) and QQ-Plot (right).

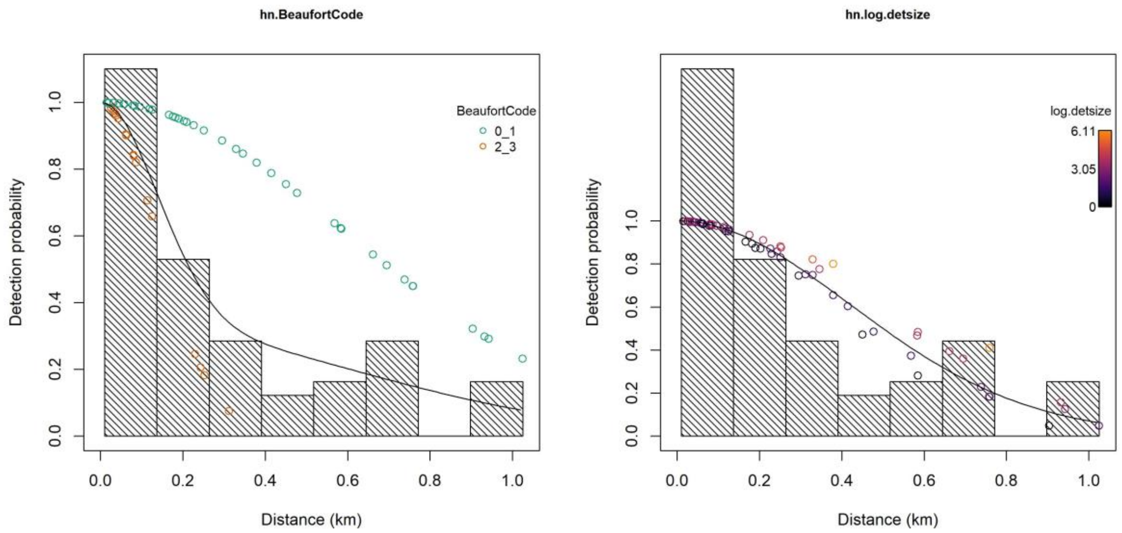


Figure C-102. Detection functions of the individual covariates.

2.9.5. Bottlenose dolphin

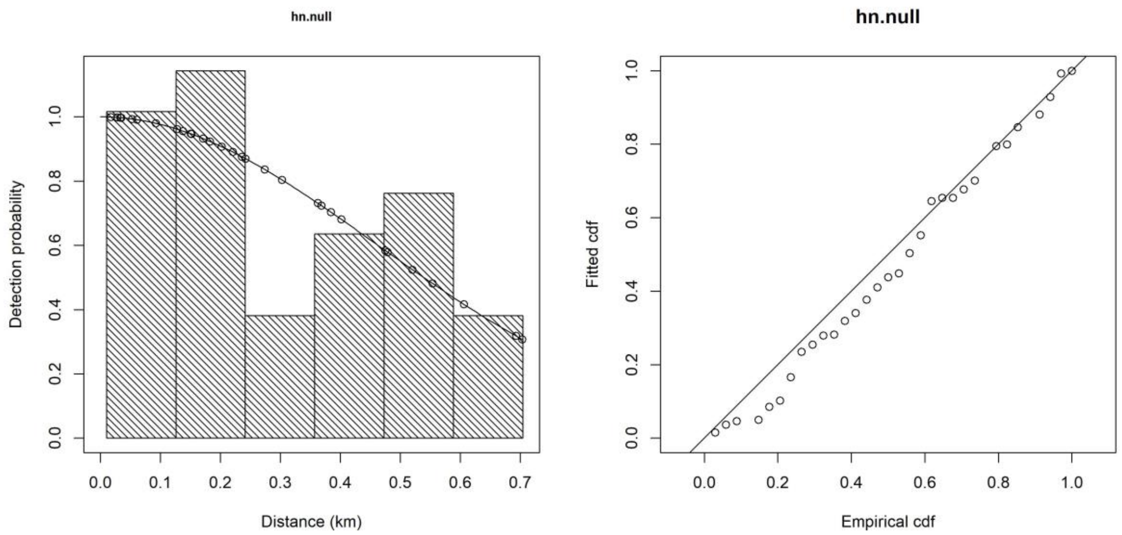


Figure C-104. Plot of the detection function (left) and QQ-Plot (right).

2.9.6. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

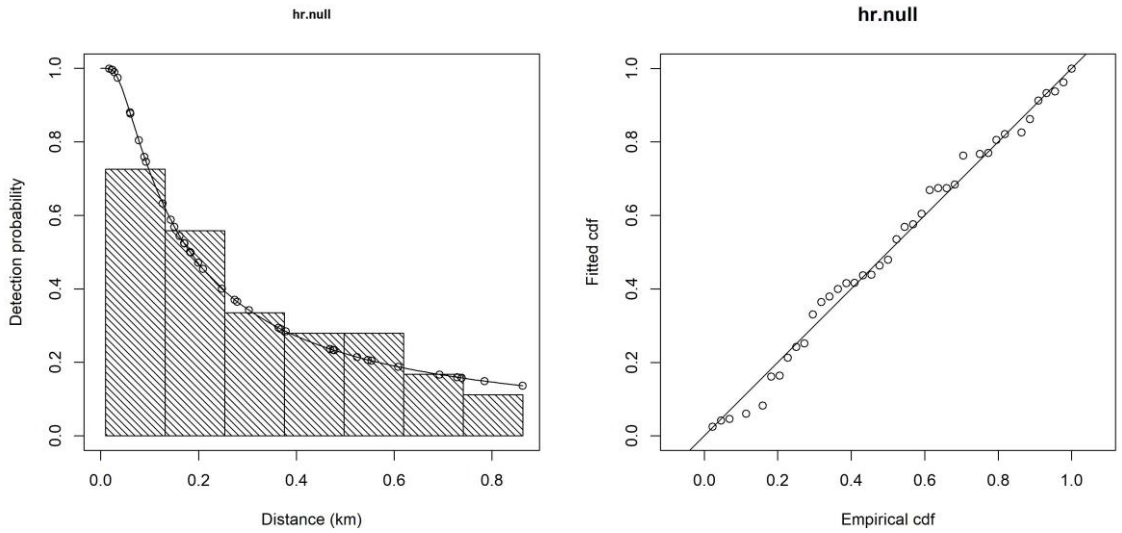


Figure C-103. Plot of the detection function (left) and QQ-Plot (right).

2.9.7. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - Unidentified dolphin

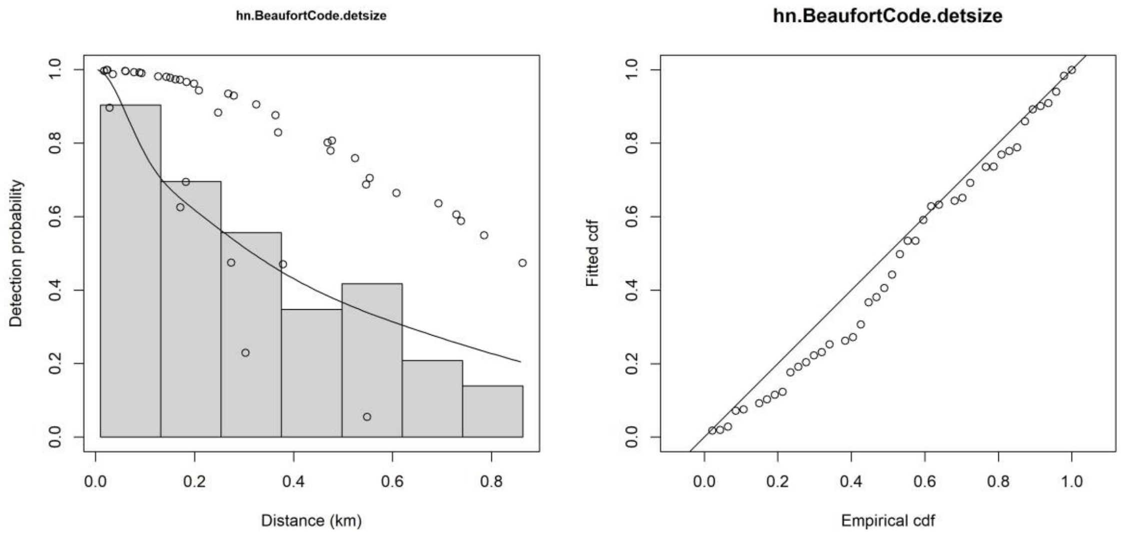


Figure C-104. Plot of the detection function (left) and QQ-Plot (right).

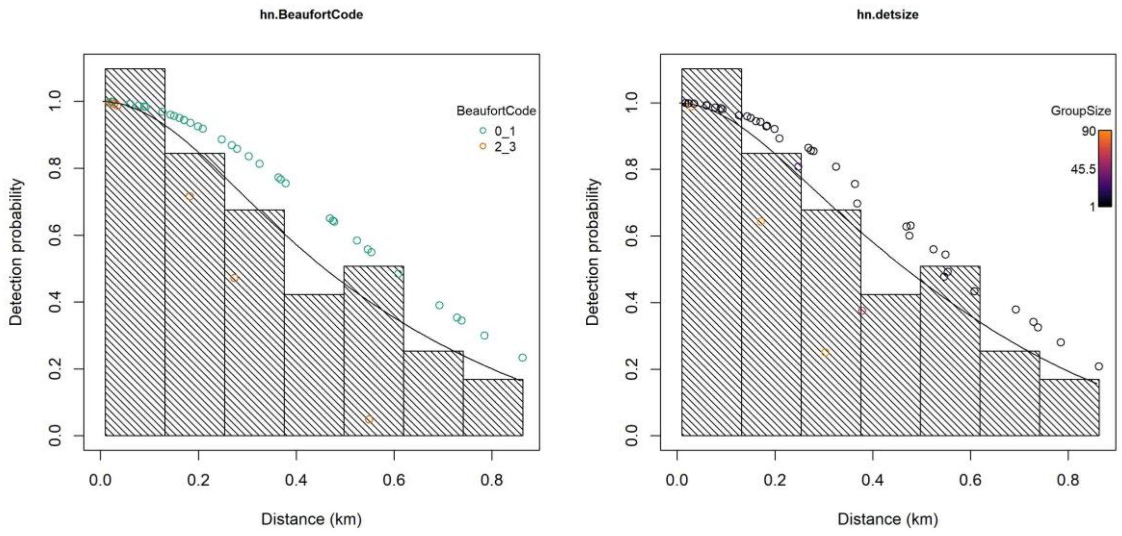


Figure C-105. Detection functions of the individual covariates.

2.10. Platform Group G11 - None

2.10.1. Harbor porpoise

Figure C-108. Plot of the detection function (left) and QQ-Plot (right).

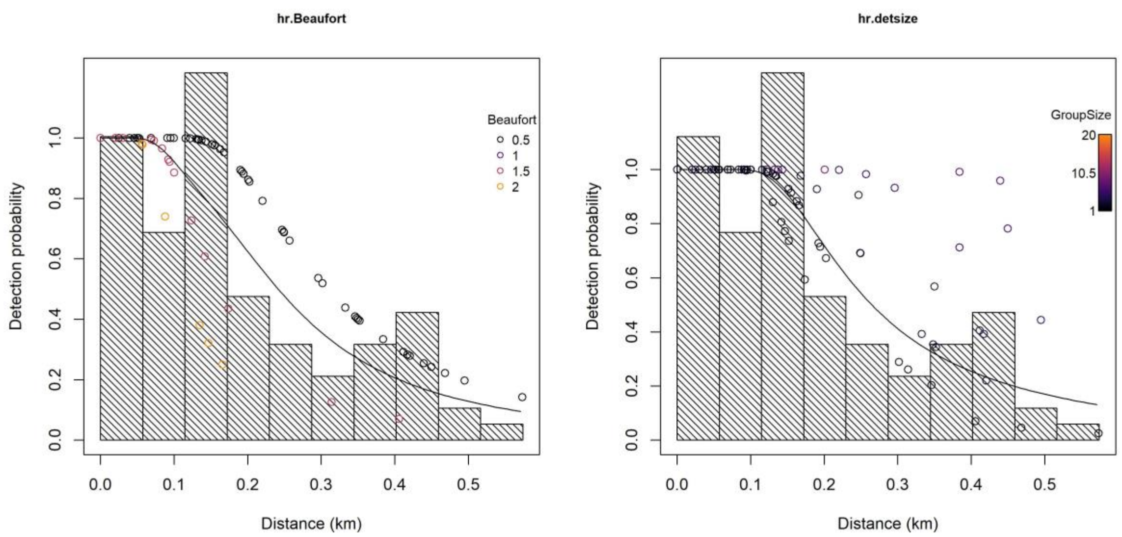


Figure C-106. Detection functions of the individual covariates.

2.10.2. Common dolphin

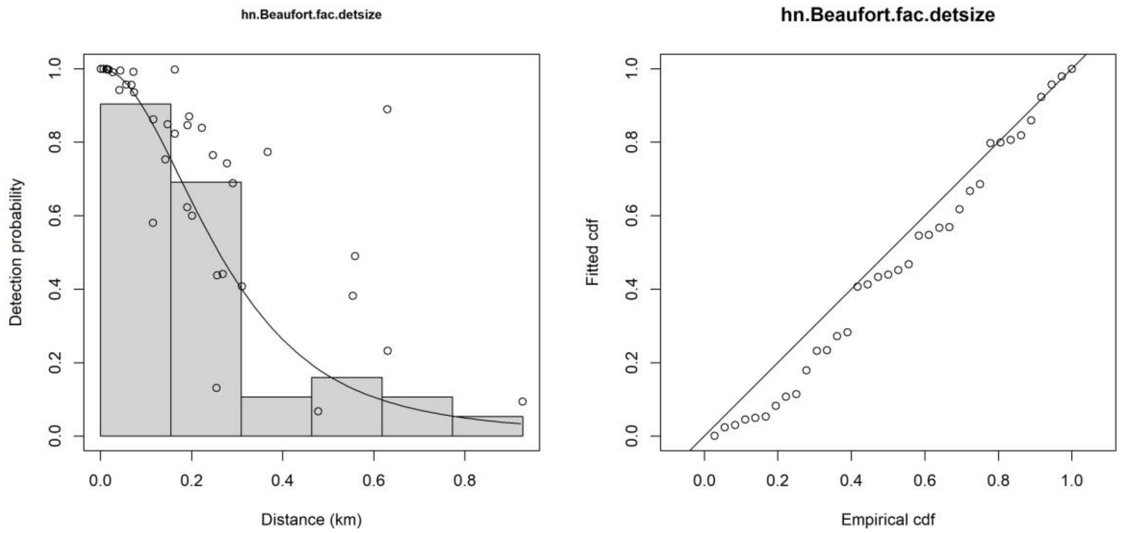


Figure C-107. Plot of the detection function (left) and QQ-Plot (right).

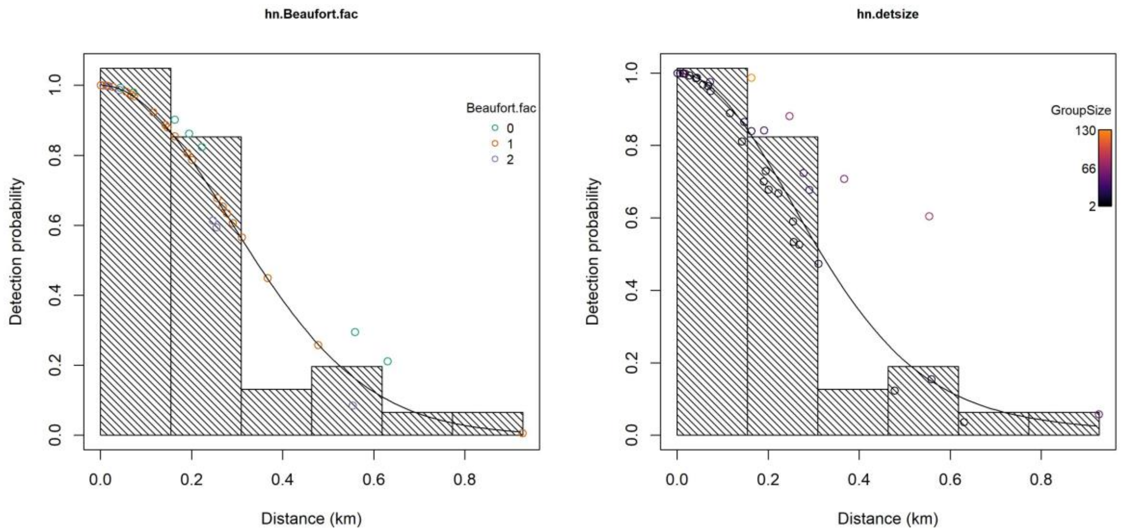


Figure C-108. Detection functions of the individual covariates.

2.10.3. Striped dolphin

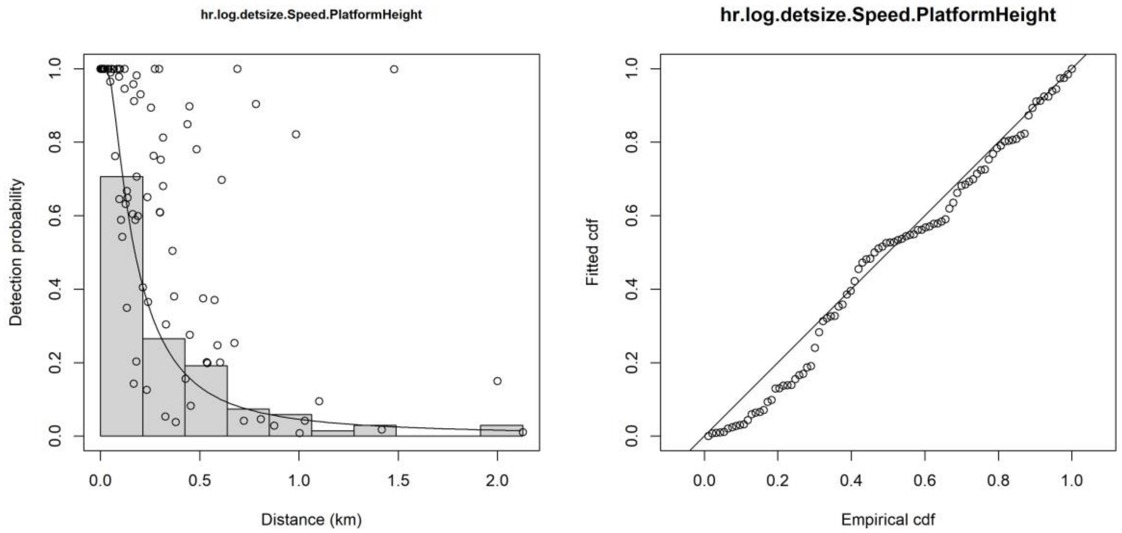


Figure C-109. Plot of the detection function (left) and QQ-Plot (right).

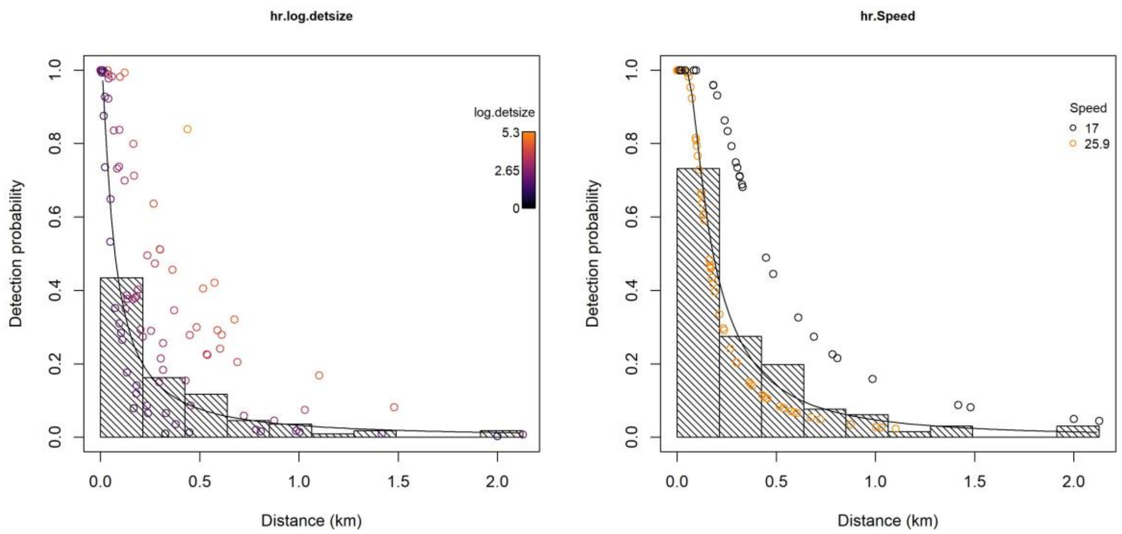


Figure C-110. Detection functions of the individual covariates.

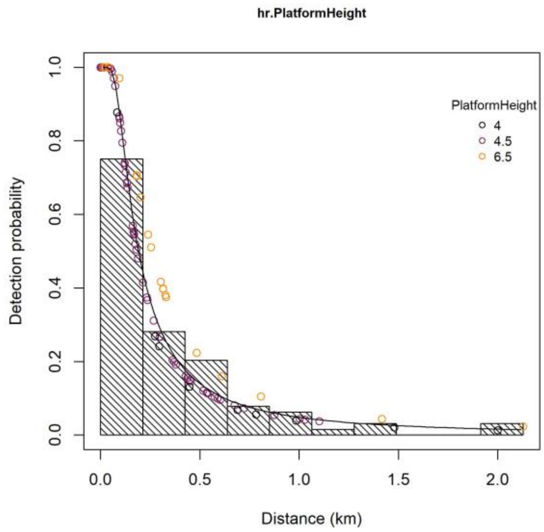


Figure C-111. Detection functions of the individual covariates.

2.10.4. Bottlenose dolphin

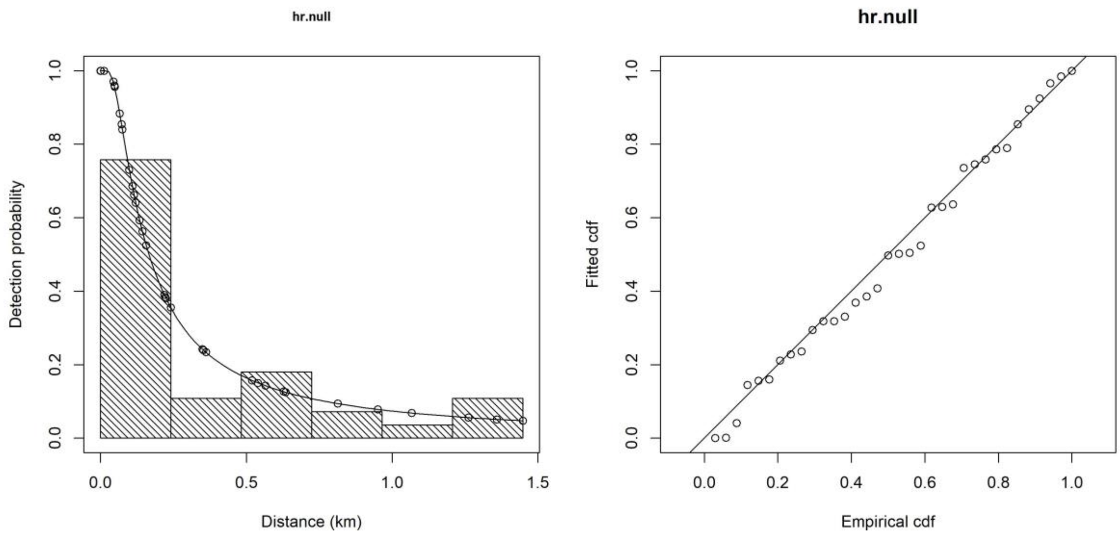


Figure C-112. Plot of the detection function (left) and QQ-Plot (right).

2.10.5. Bottlenose dolphin - Risso's dolphin

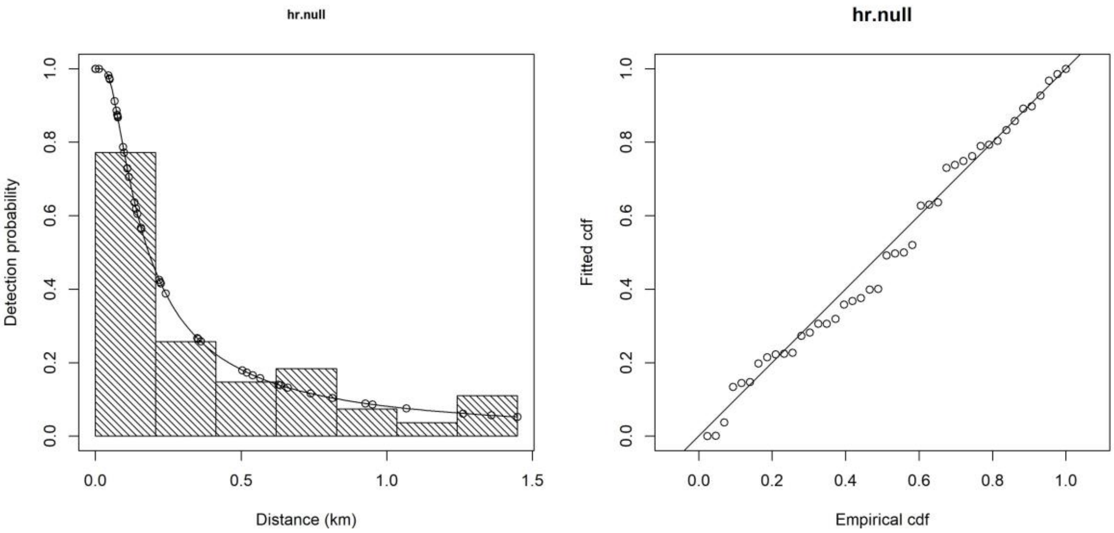


Figure C-113. Plot of the detection function (left) and QQ-Plot (right).

2.10.6. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

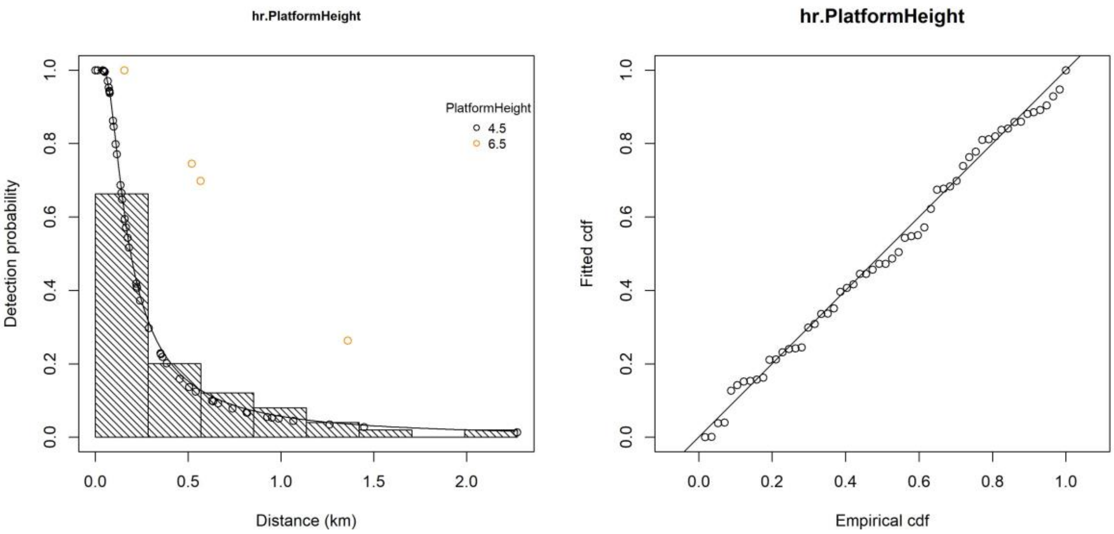


Figure C-114. Plot of the detection function (left) and QQ-Plot (right).

2.10.7. Unidentified dolphin

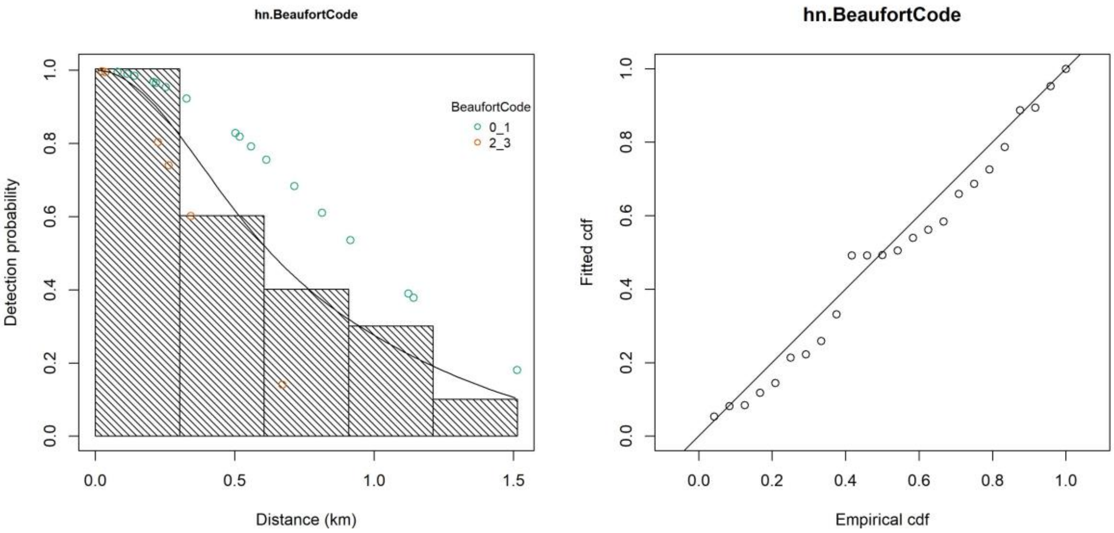


Figure C-115. Plot of the detection function (left) and QQ-Plot (right).

2.11. Platform Group G12 - G18 - None

2.11.1. Risso's dolphin

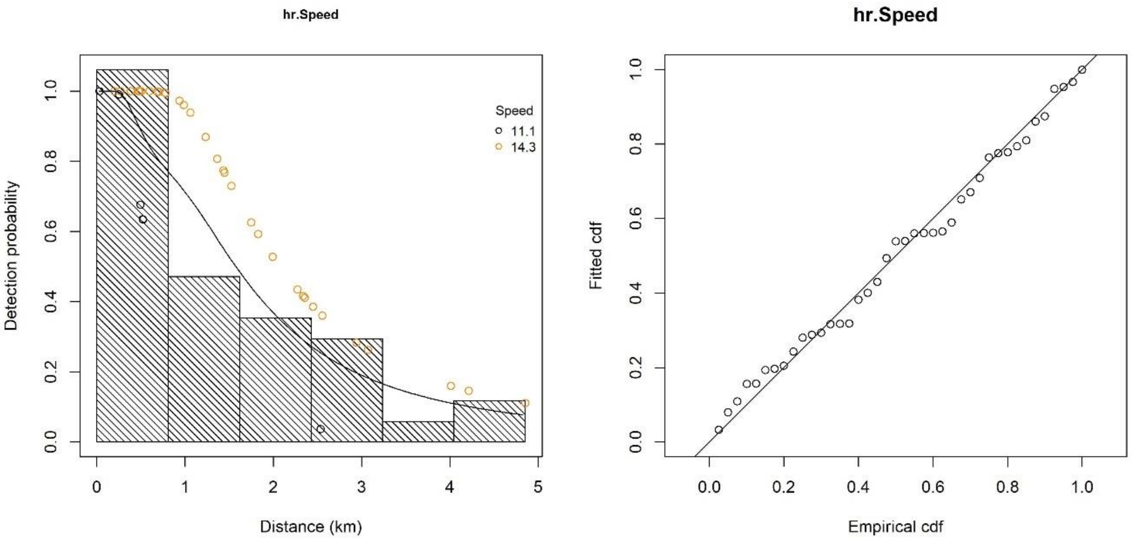


Figure C-116. Plot of the detection function (left) and QQ-Plot (right).

2.11.2. Sperm whale

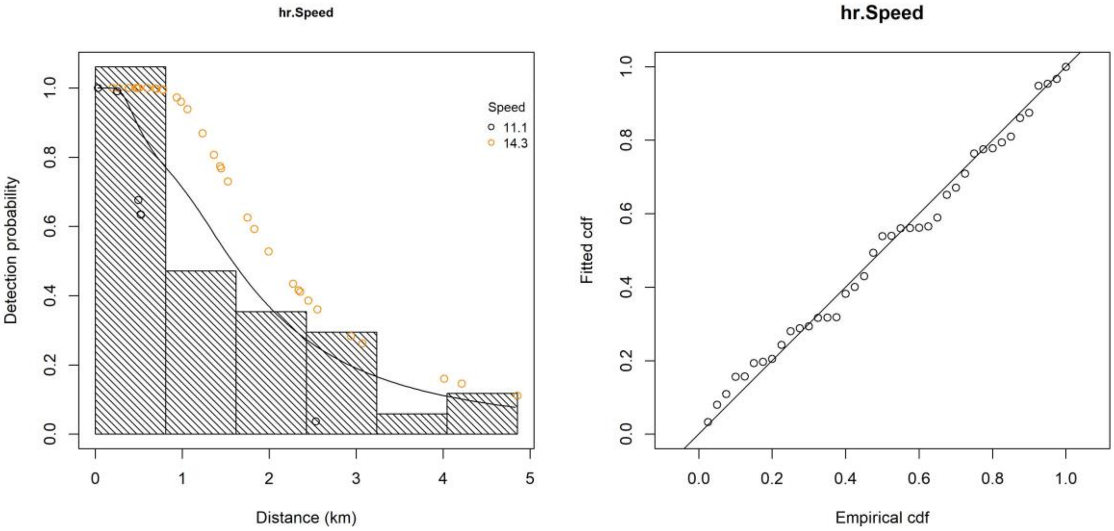


Figure C-117. Plot of the detection function (left) and QQ-Plot (right).

2.11.3. Striped dolphin

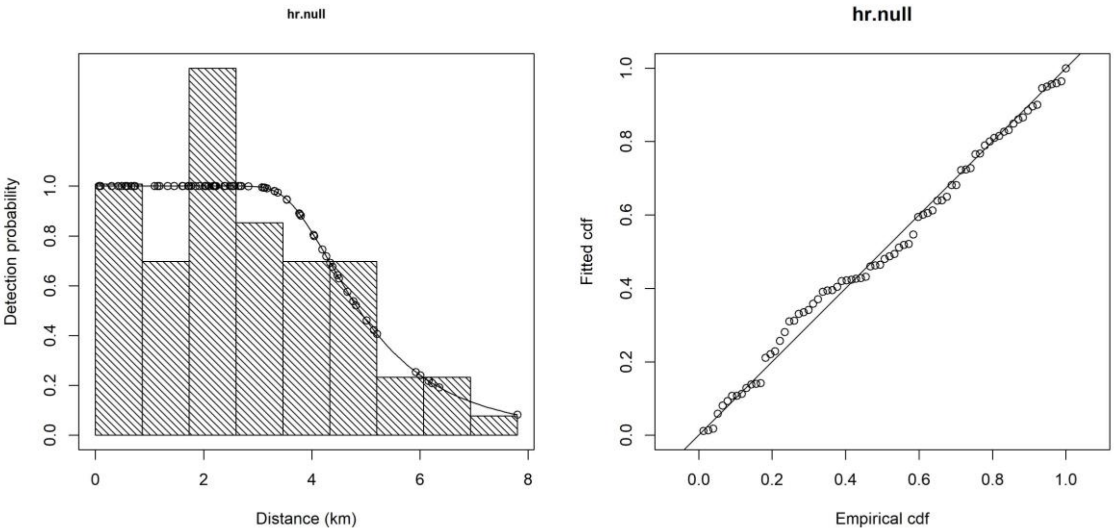


Figure C-118. Plot of the detection function (left) and QQ-Plot (right).

2.11.4. Cuvier's beaked whale

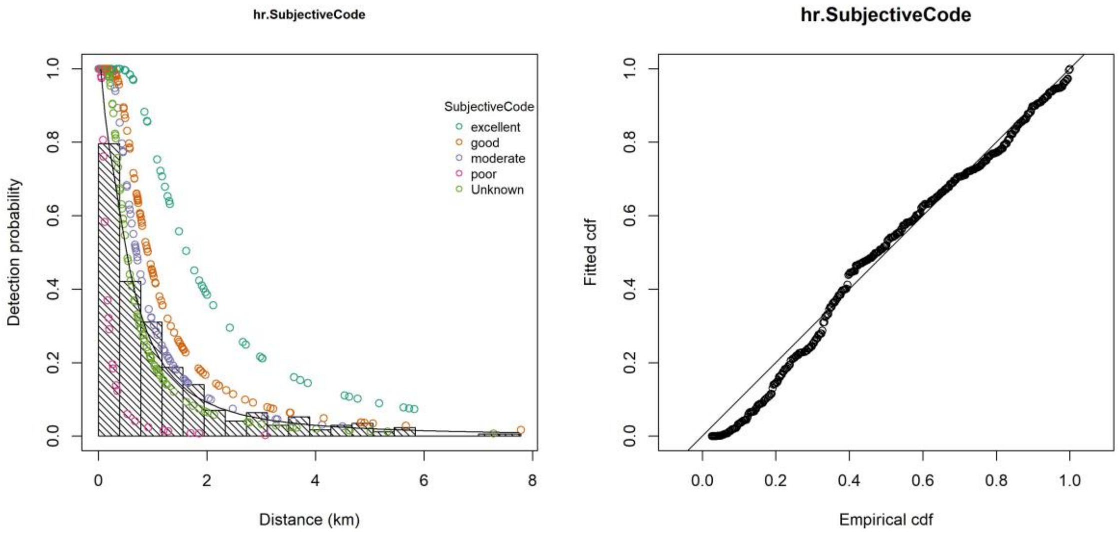


Figure C-119. Plot of the detection function (left) and QQ-Plot (right).

2.12. Platform Group G12 - None

2.12.1. Fin whale

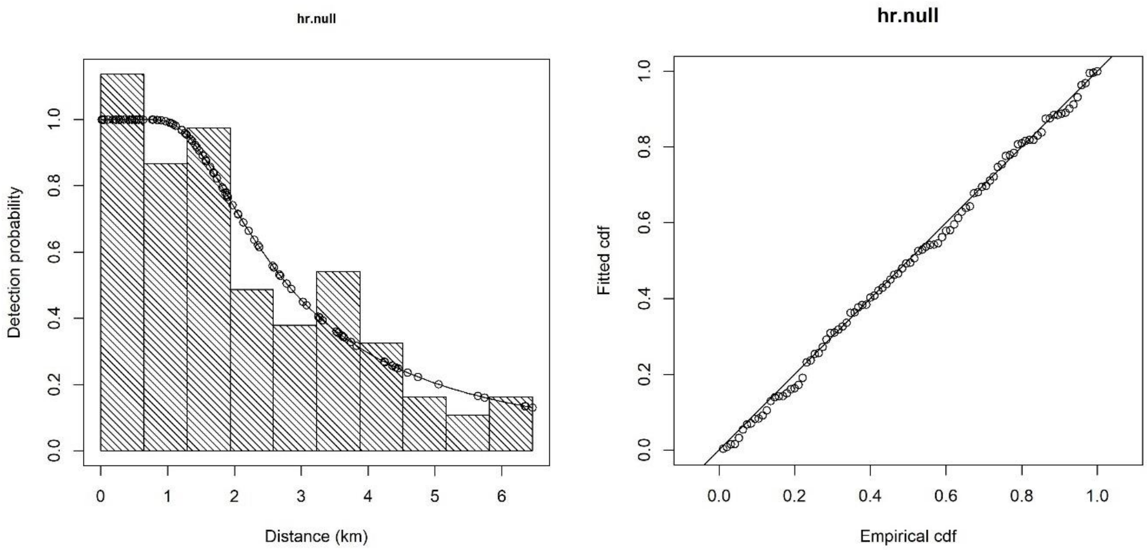


Figure C-120. Plot of the detection function (left) and QQ-Plot (right).

2.12.2. Common dolphin

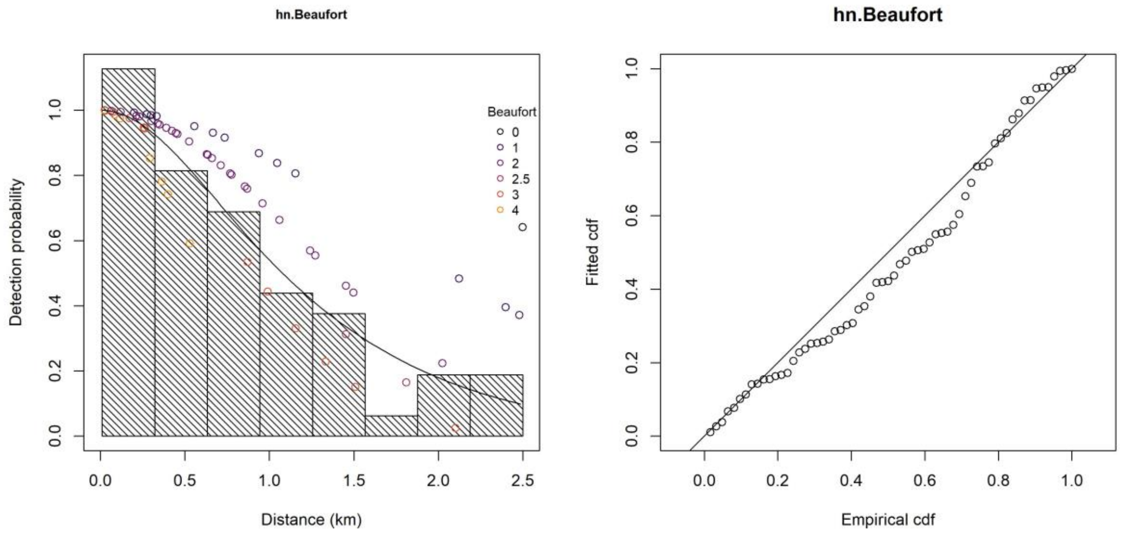


Figure C-121. Plot of the detection function (left) and QQ-Plot (right).

2.12.3. Risso's dolphin

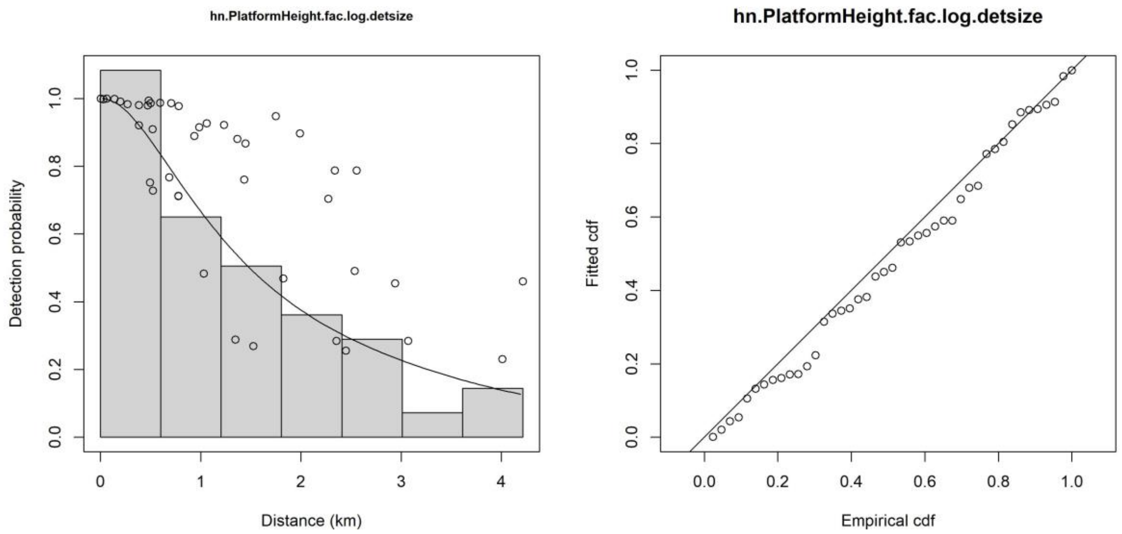


Figure C-122. Plot of the detection function (left) and QQ-Plot (right).

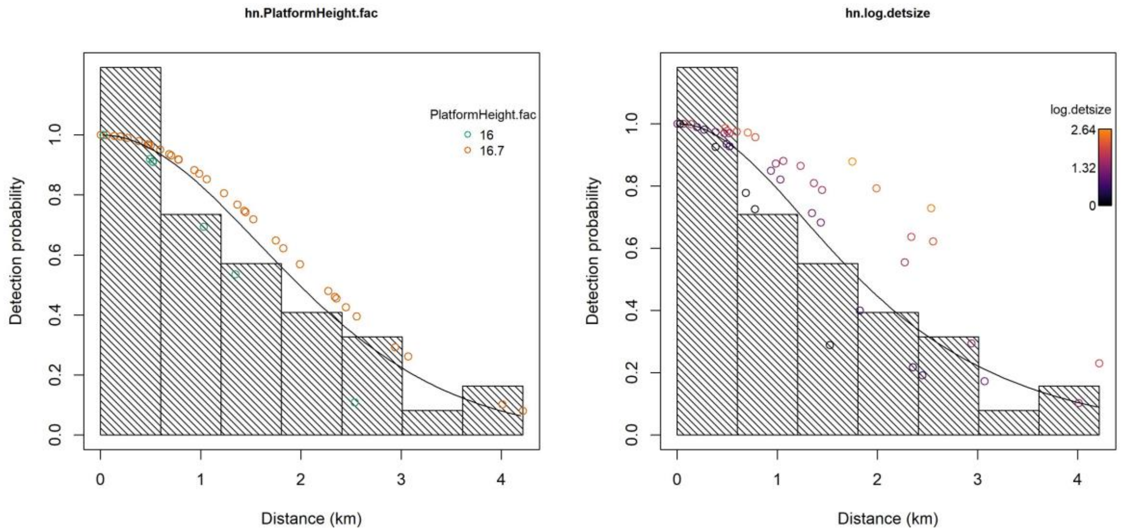


Figure C-123. Detection functions of the individual covariates.

2.12.4. Long-finned pilot whale

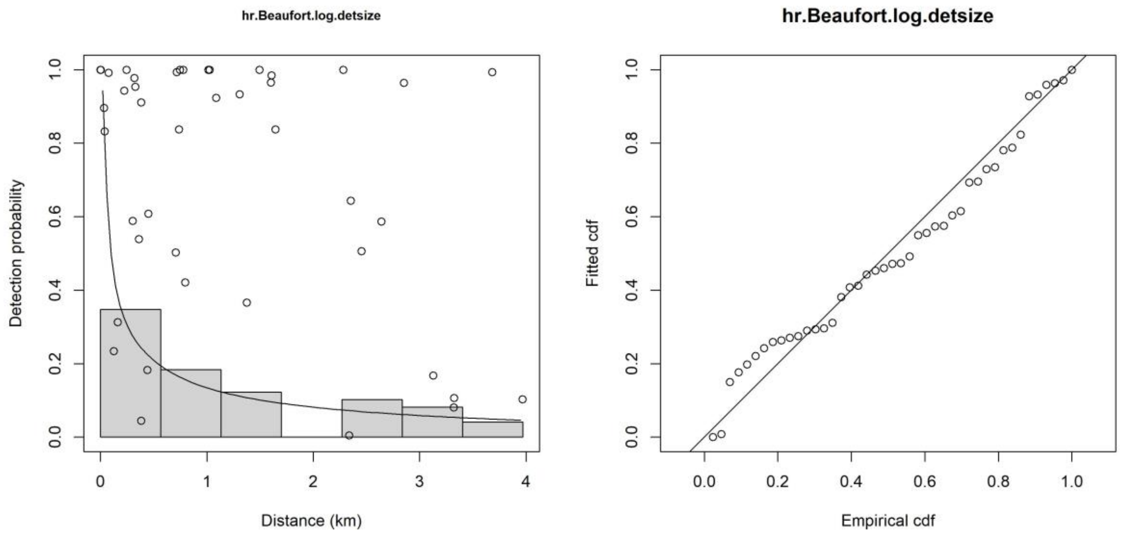


Figure C-124. Plot of the detection function (left) and QQ-Plot (right).

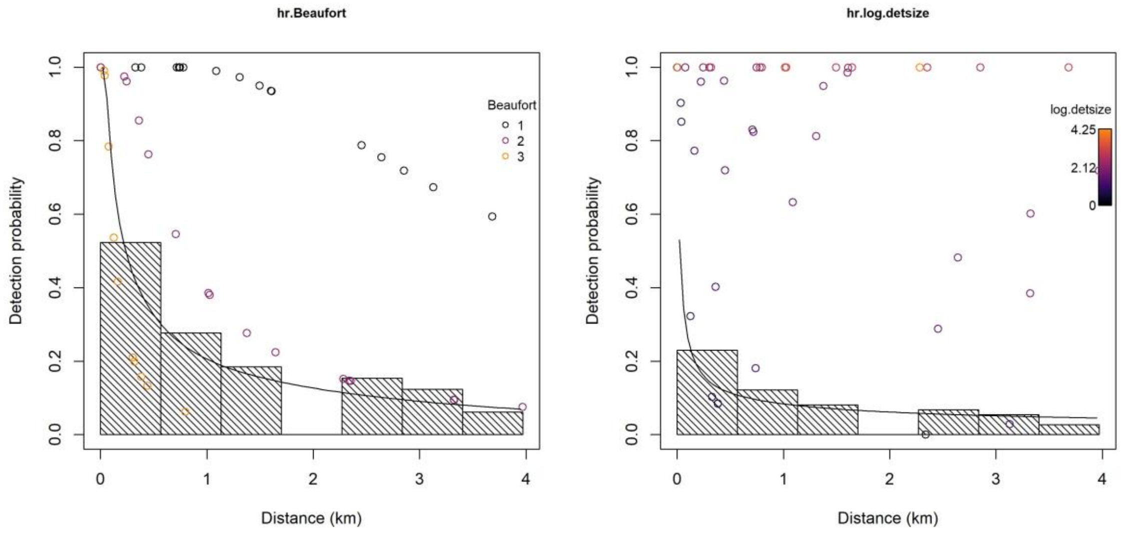


Figure C-125. Detection functions of the individual covariates.

2.12.5. Sperm whale

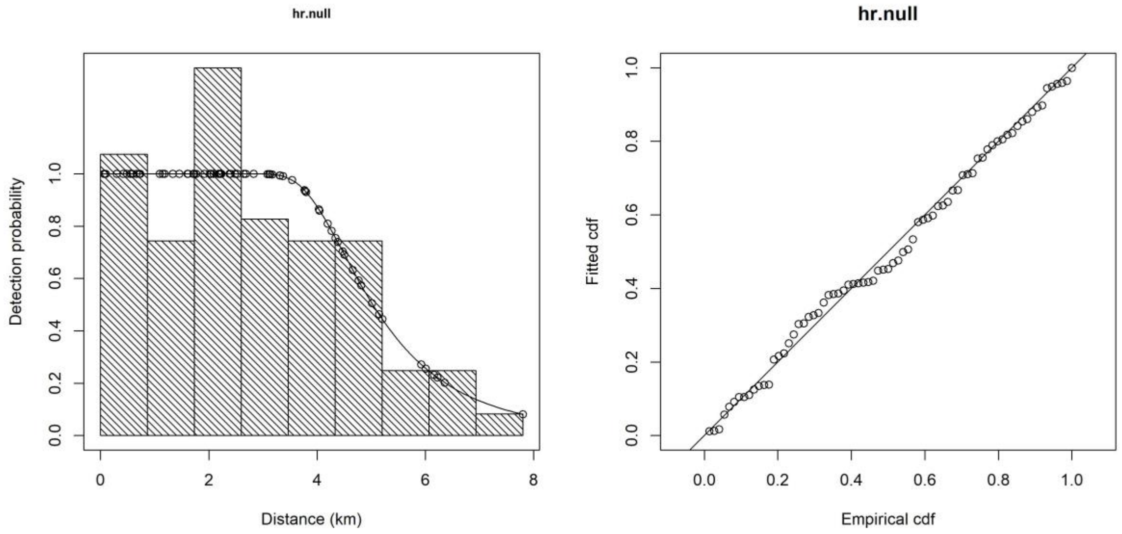


Figure C-126. Plot of the detection function (left) and QQ-Plot (right).

2.12.6. Striped dolphin

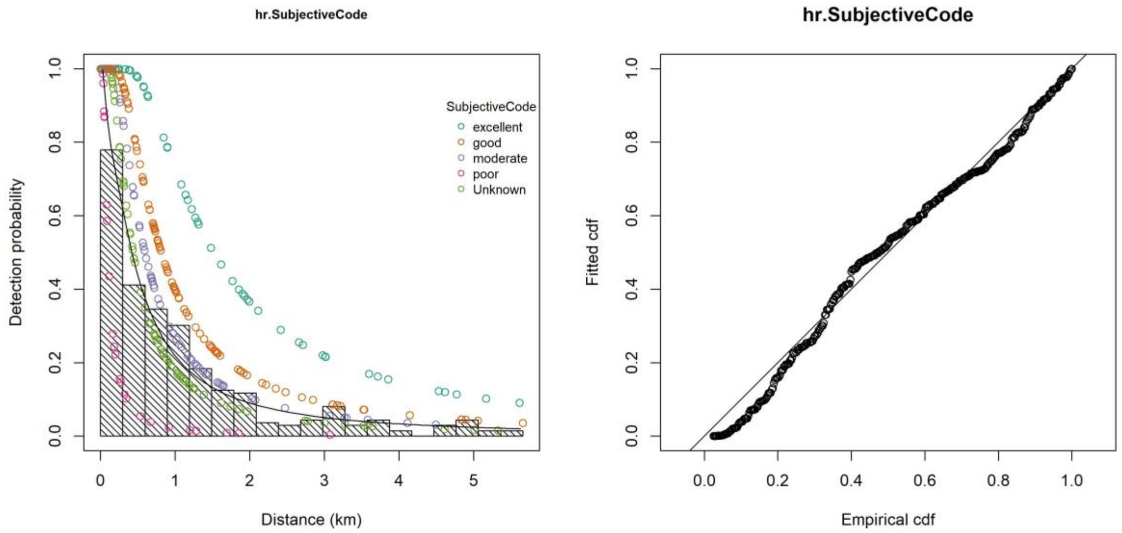


Figure C-127. Plot of the detection function (left) and QQ-Plot (right).

2.12.7. Bottlenose dolphin - Risso’s dolphin

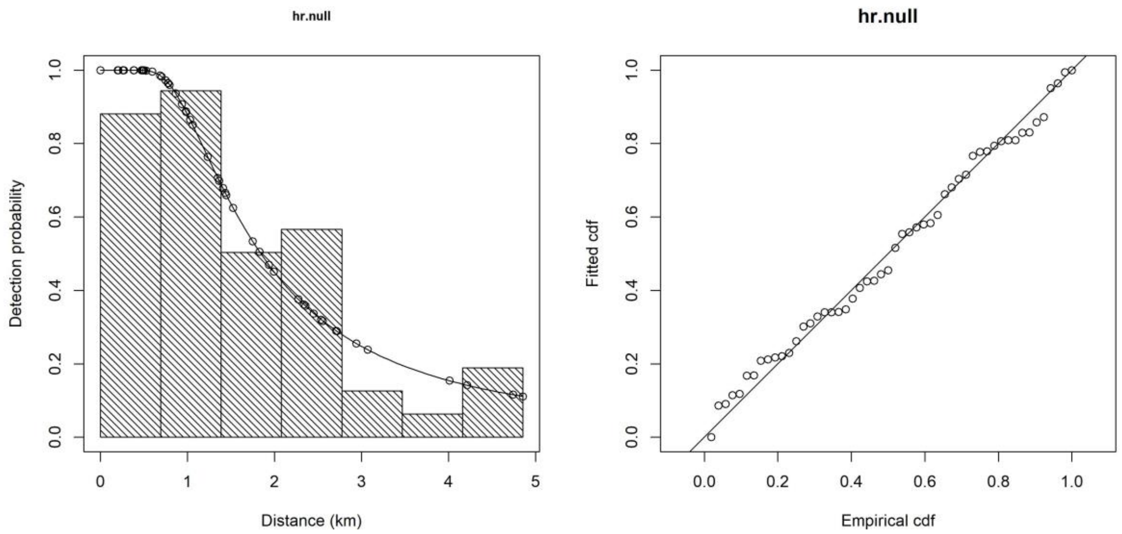


Figure C-128. Plot of the detection function (left) and QQ-Plot (right).

2.12.8. Unidentified dolphin

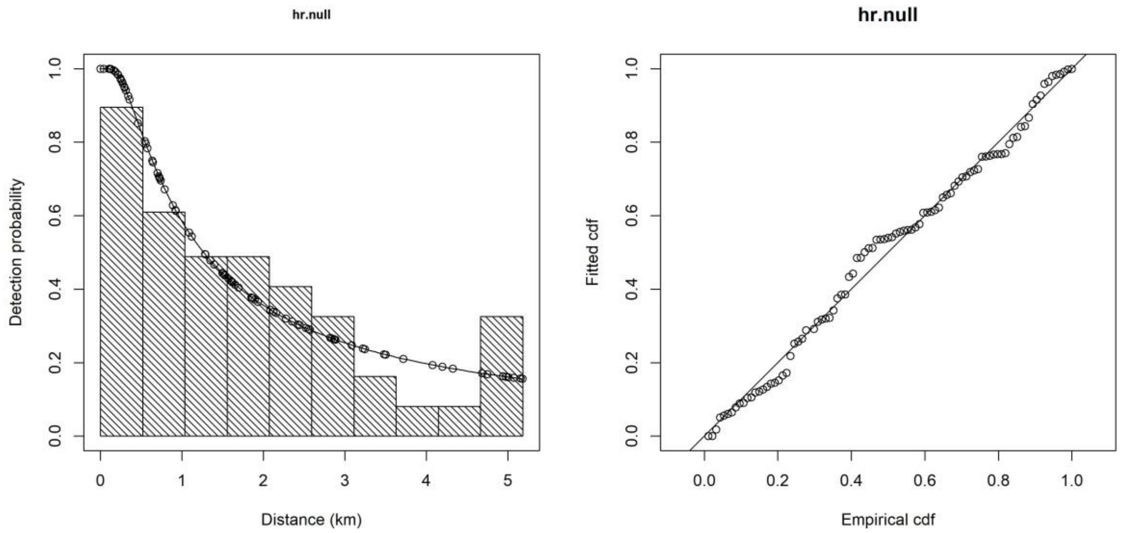


Figure C-129. Plot of the detection function (left) and QQ-Plot (right).

2.12.9. Cuvier's beaked whale

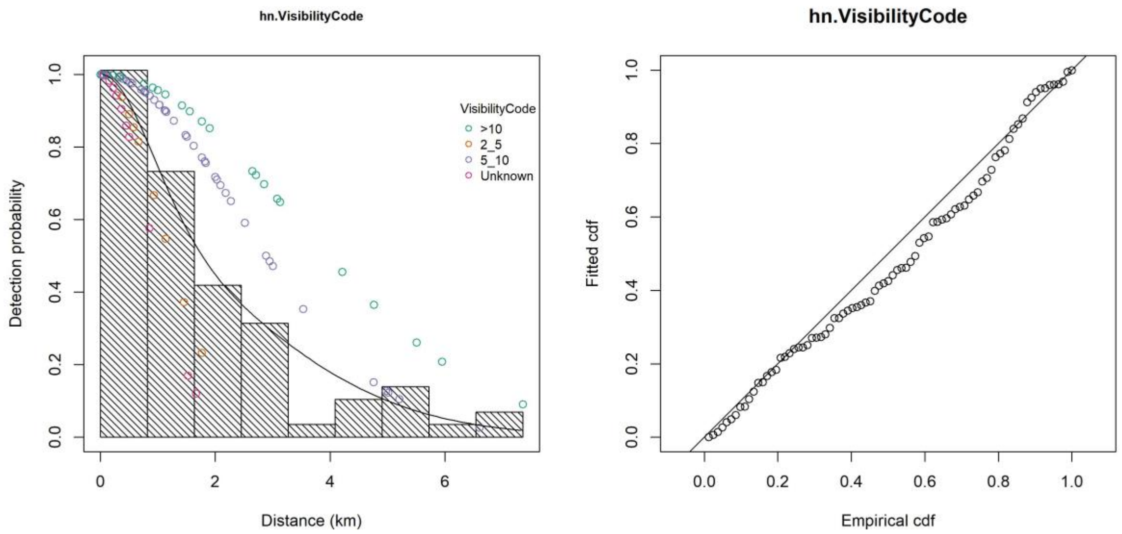


Figure C-130. Plot of the detection function (left) and QQ-Plot (right).

2.12.10. Unidentified beaked whale

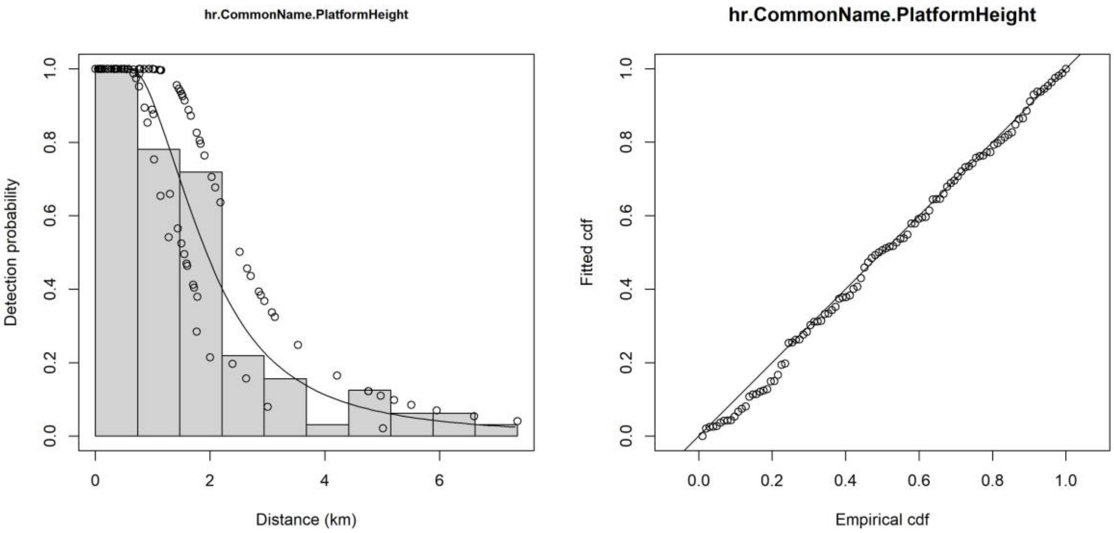


Figure C-131. Plot of the detection function (left) and QQ-Plot (right).

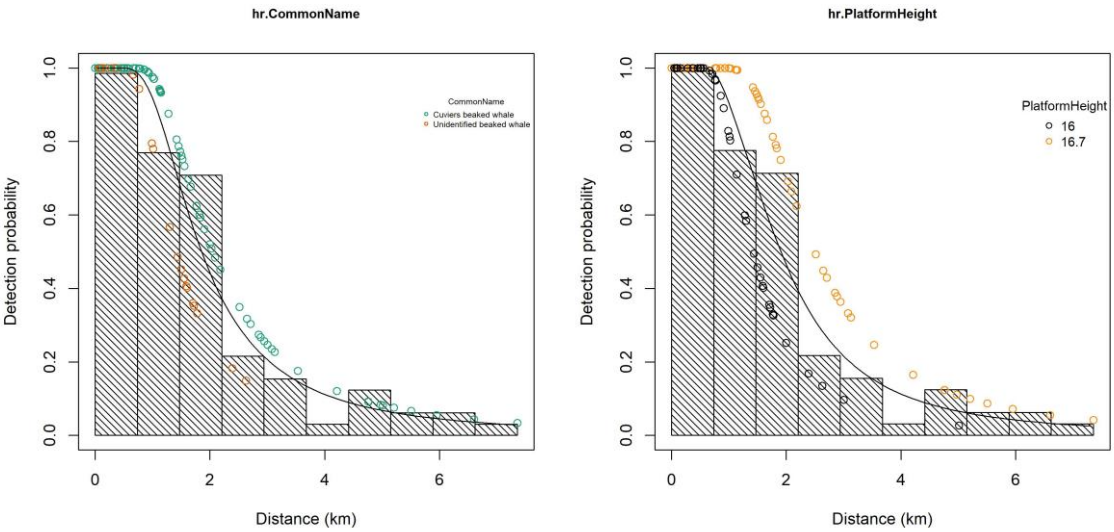


Figure C-132. Detection functions of the individual covariates.

2.13. Platform Group G13 - None

2.13.1. Fin whale

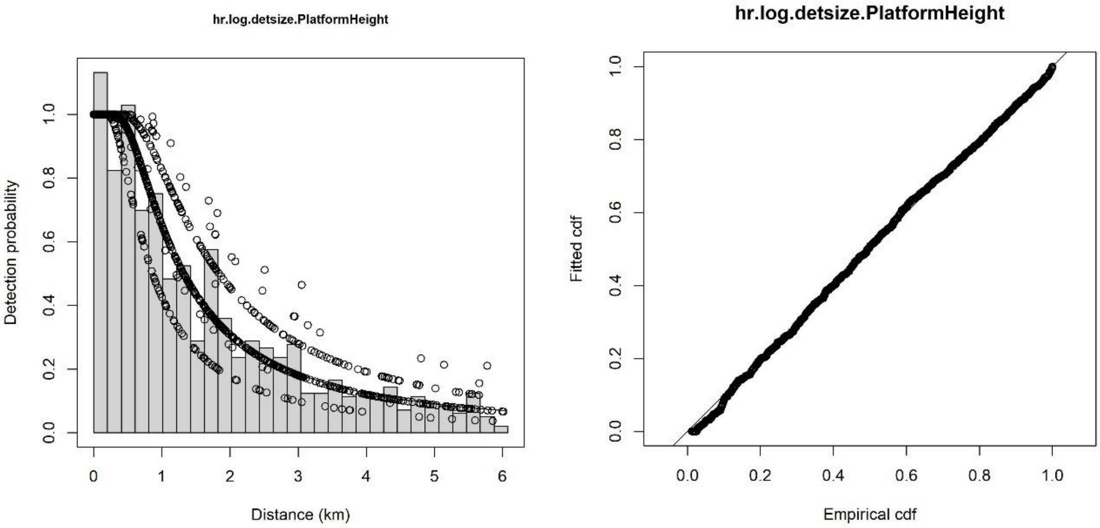


Figure C-133. Plot of the detection function (left) and QQ-Plot (right).

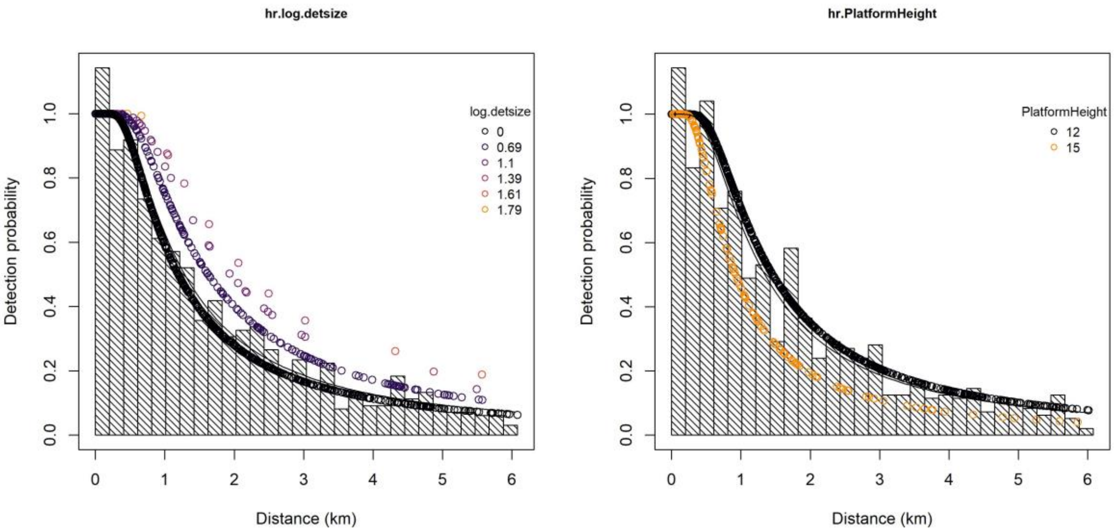


Figure C-134. Detection functions of the individual covariates.

2.13.2. Common dolphin

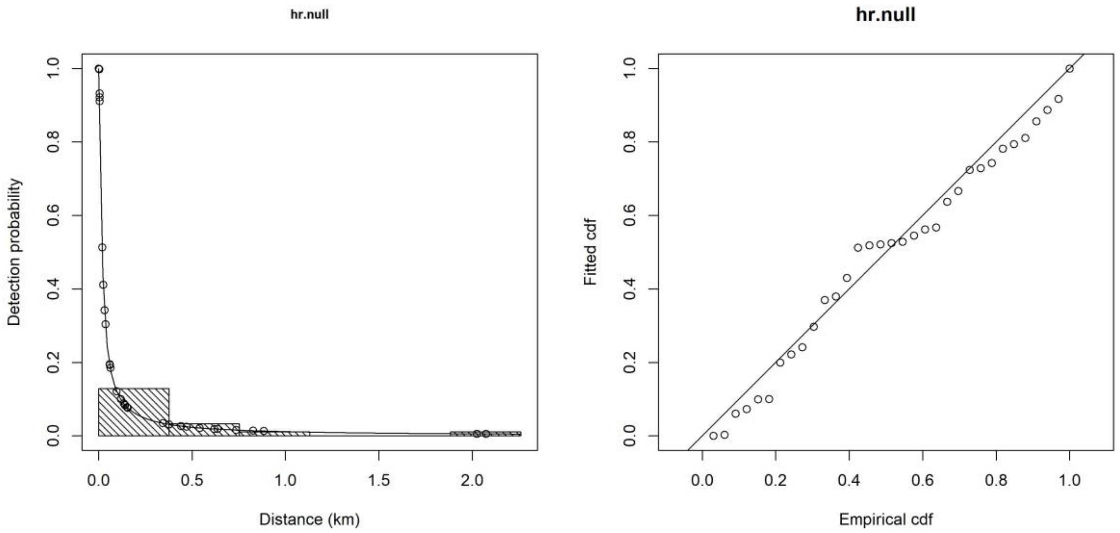


Figure C-135. Plot of the detection function (left) and QQ-Plot (right).

2.13.3. Risso's dolphin - Long-finned pilot whale - Killer whale

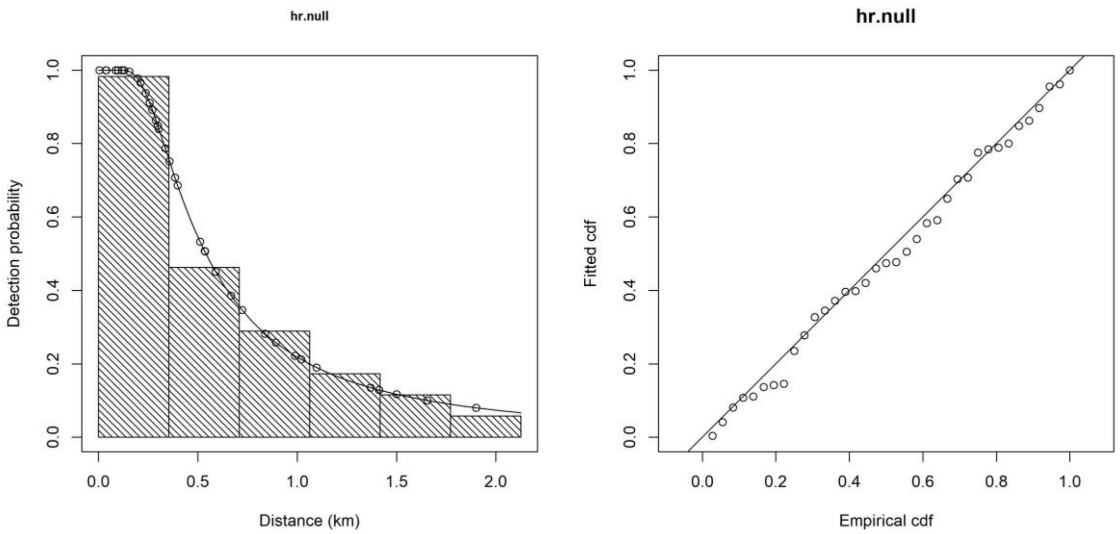


Figure C-136. Plot of the detection function (left) and QQ-Plot (right).

2.13.4. Sperm whale

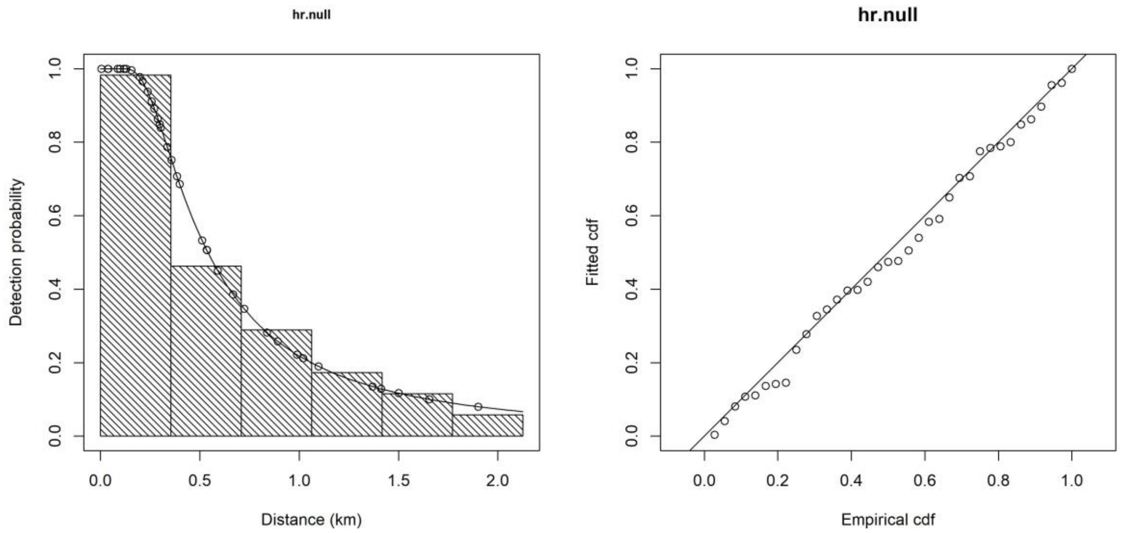


Figure C-137. Plot of the detection function (left) and QQ-Plot (right).

2.13.5. Striped dolphin

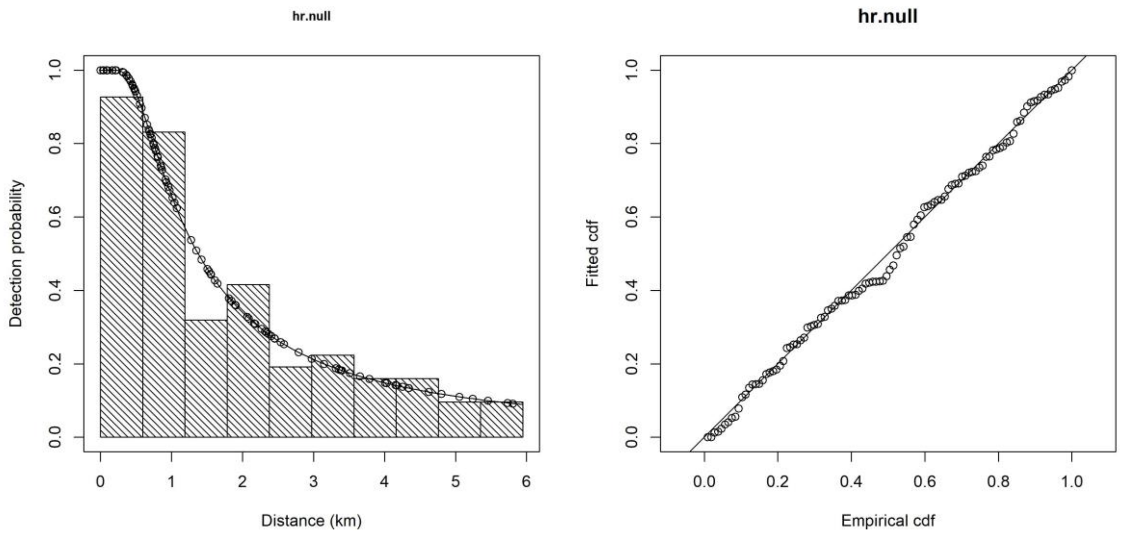


Figure C-138. Plot of the detection function (left) and QQ-Plot (right).

2.13.6. Bottlenose dolphin

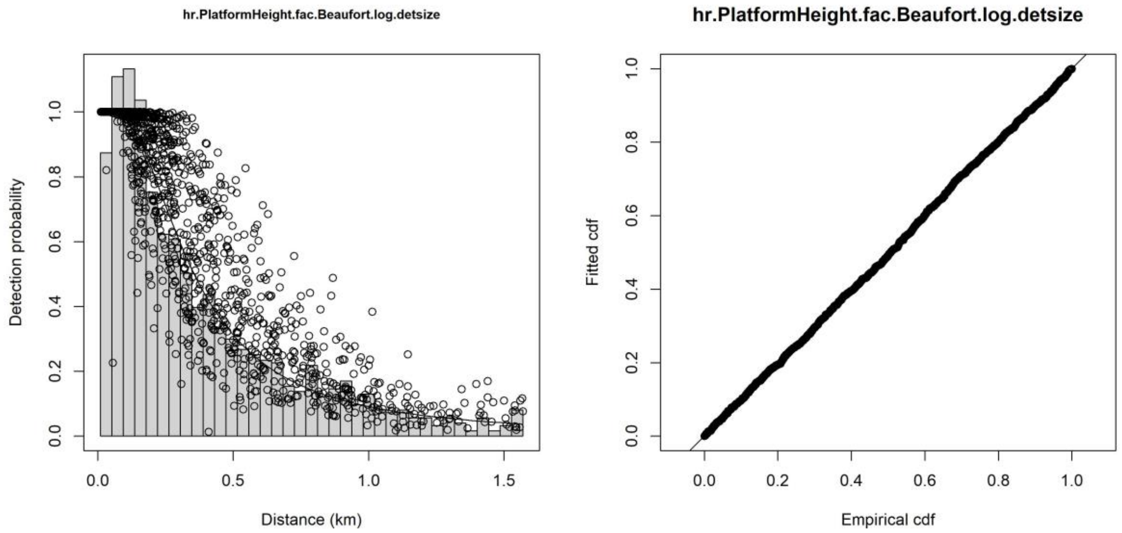


Figure C-139. Plot of the detection function (left) and QQ-Plot (right).

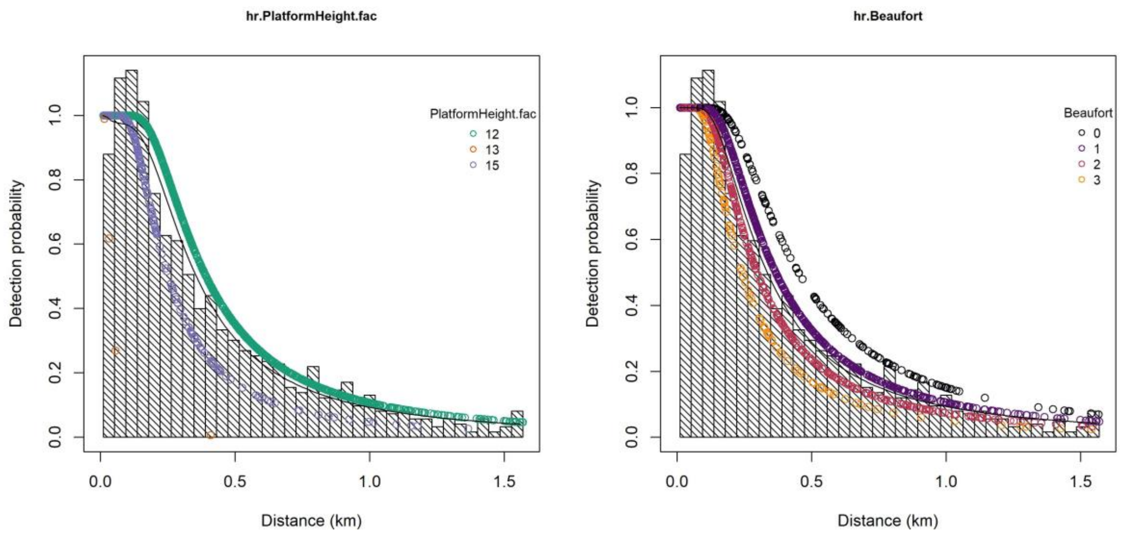


Figure C-140. Detection functions of the individual covariates.

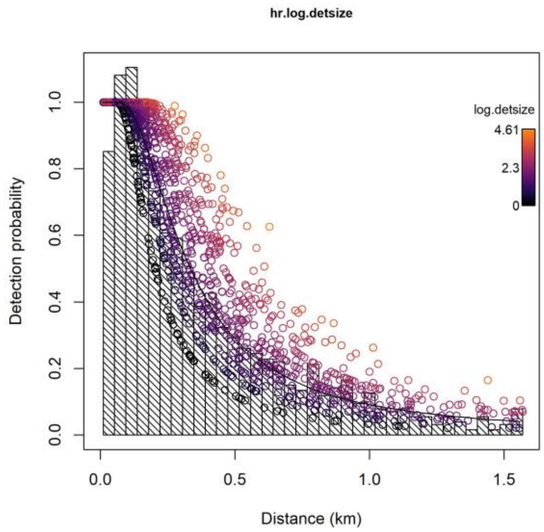


Figure C-141. Detection functions of the individual covariates.

2.13.7. Bottlenose dolphin - Risso's dolphin

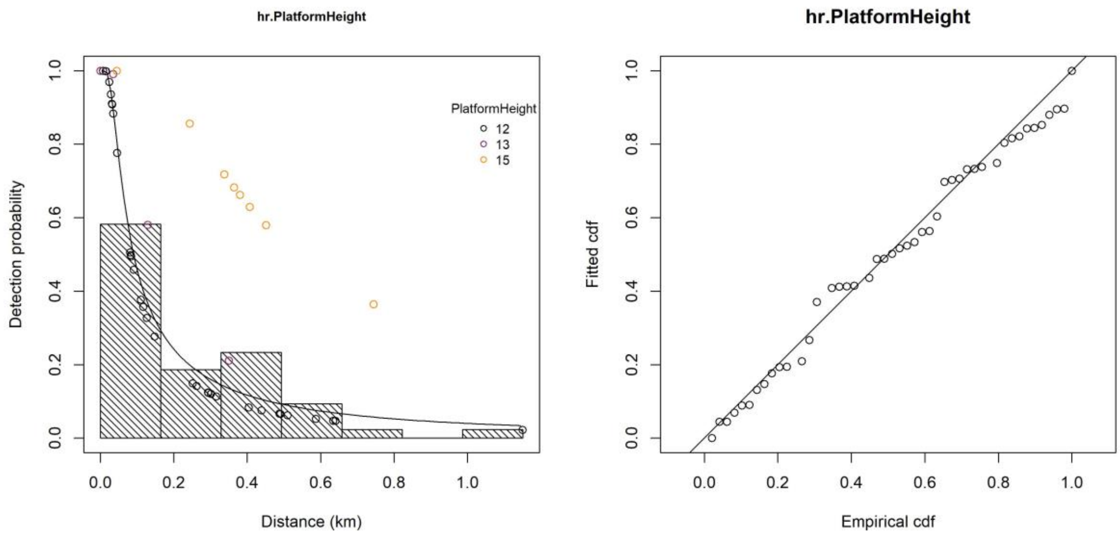


Figure C-142. Plot of the detection function (left) and QQ-Plot (right).

2.13.8. Unidentified dolphin - Unidentified small dolphin

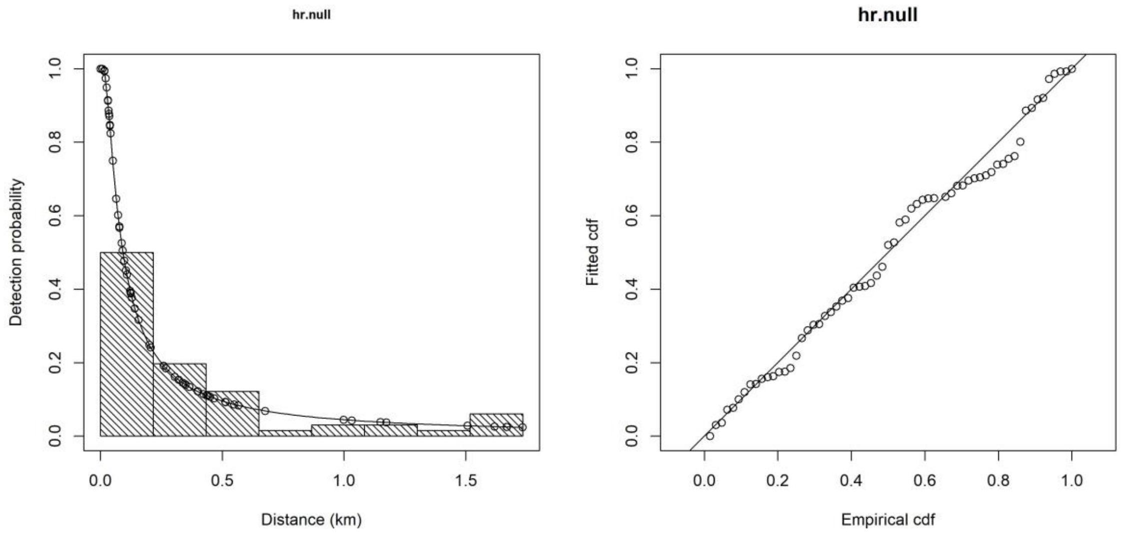


Figure C-143. Plot of the detection function (left) and QQ-Plot (right).

2.13.9. Cuvier's beaked whale

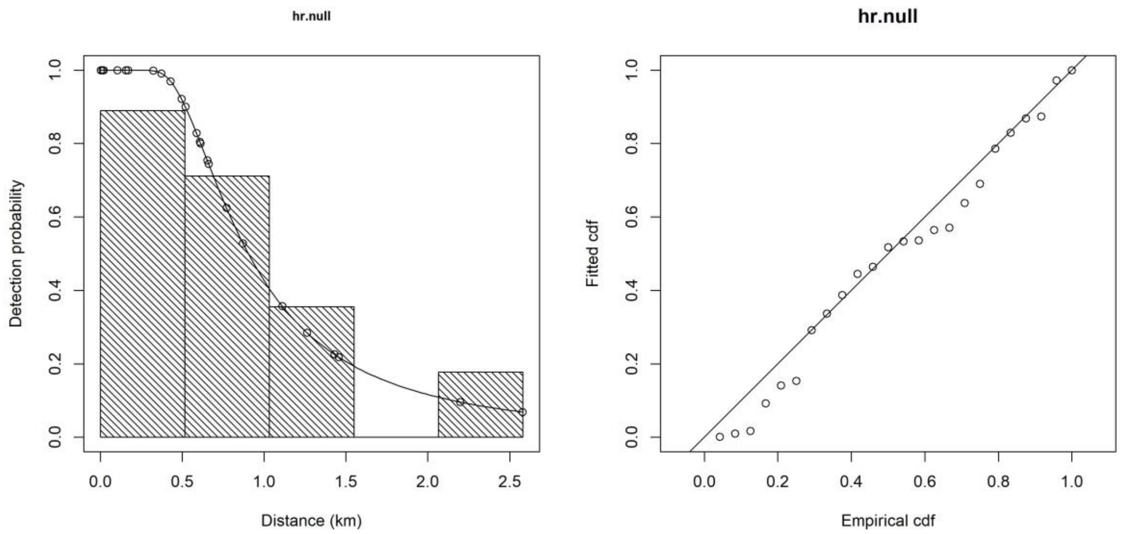


Figure C-144. Plot of the detection function (left) and QQ-Plot (right).

2.14. Platform Group G14 - G15 - None

2.14.1. Risso’s dolphin - Long-finned pilot whale

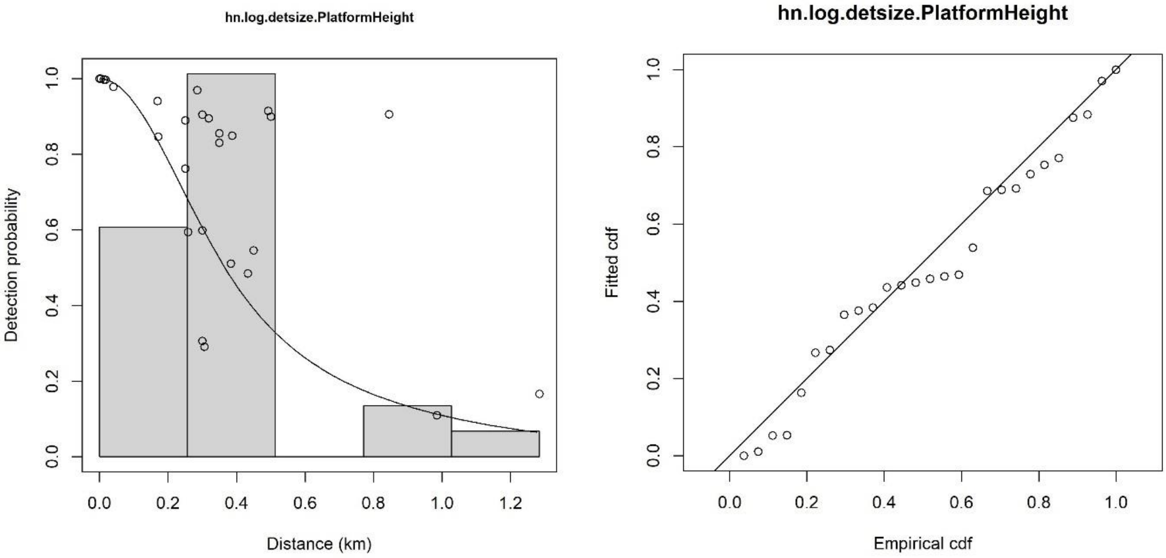


Figure C-145. Plot of the detection function (left) and QQ-Plot (right).

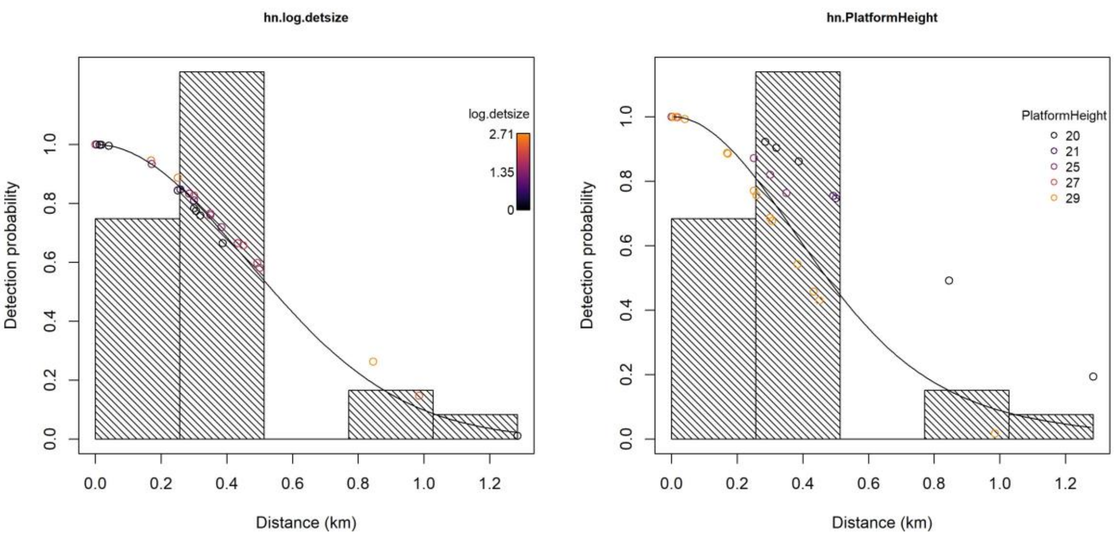


Figure C-146. Detection functions of the individual covariates.

2.15. Platform Group G14 - None

2.15.1. Common dolphin

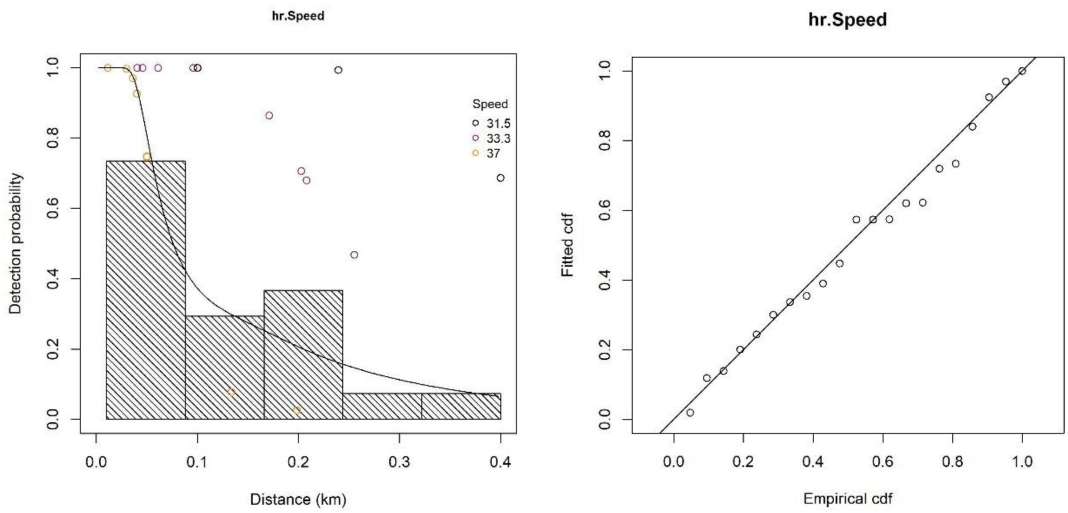


Figure C-147. Plot of the detection function (left) and QQ-Plot (right).

2.15.2. Sperm whale

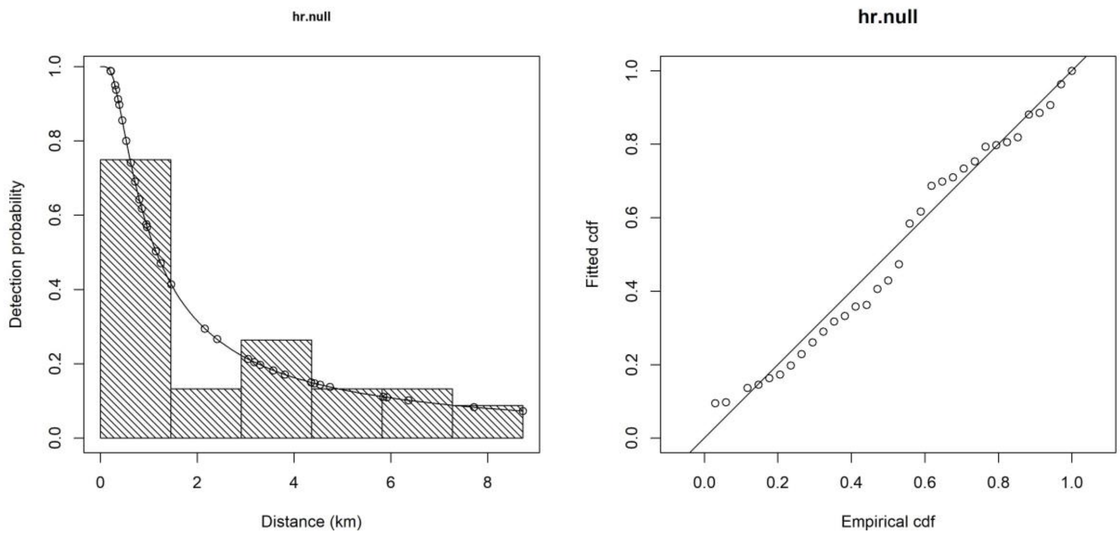


Figure C-148. Plot of the detection function (left) and QQ-Plot (right).

2.15.3. Bottlenose dolphin

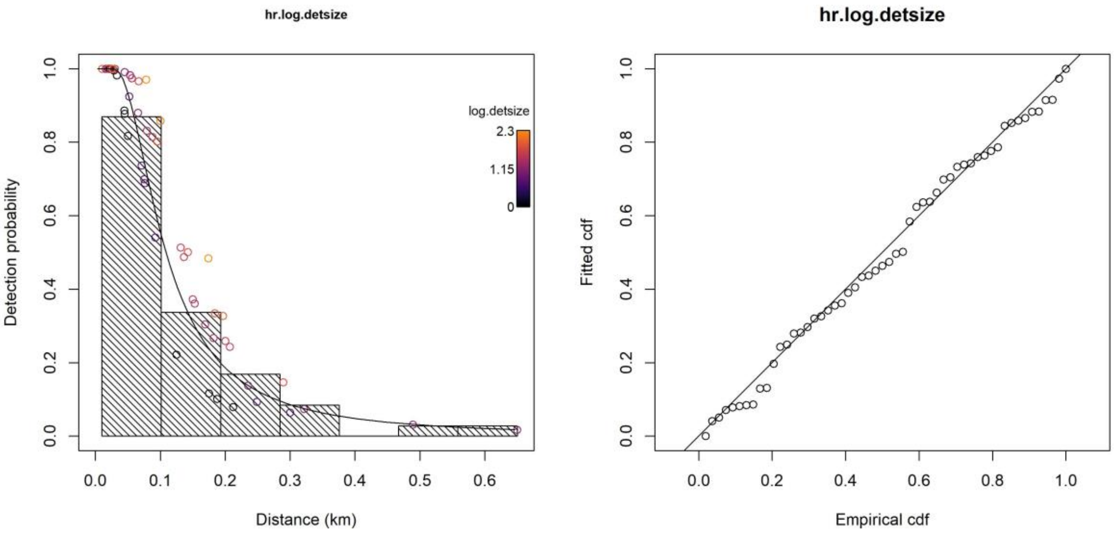


Figure C-149. Plot of the detection function (left) and QQ-Plot (right).

2.15.4. Bottlenose dolphin - Risso's dolphin

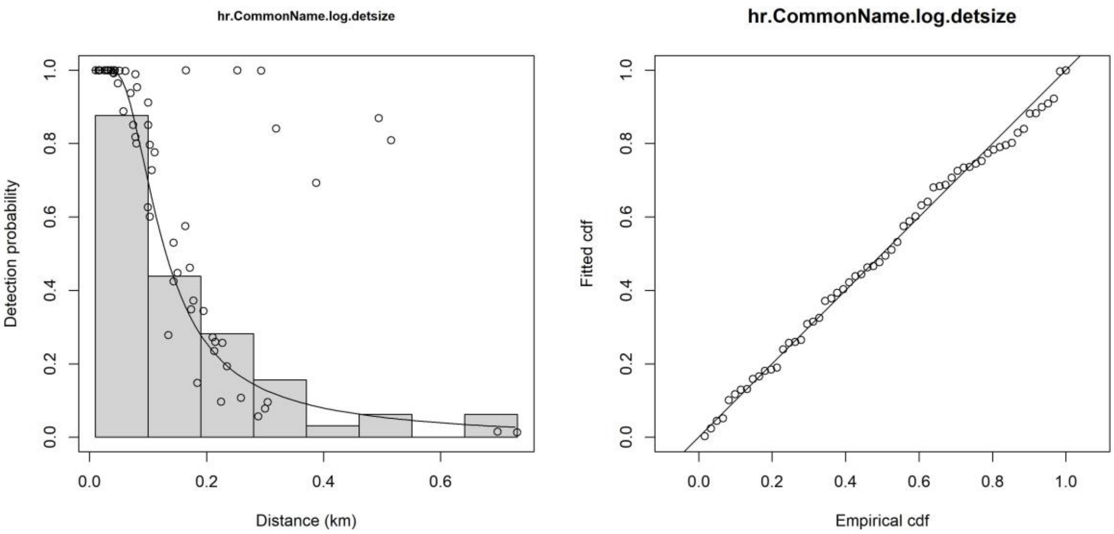


Figure C-150. Plot of the detection function (left) and QQ-Plot (right).

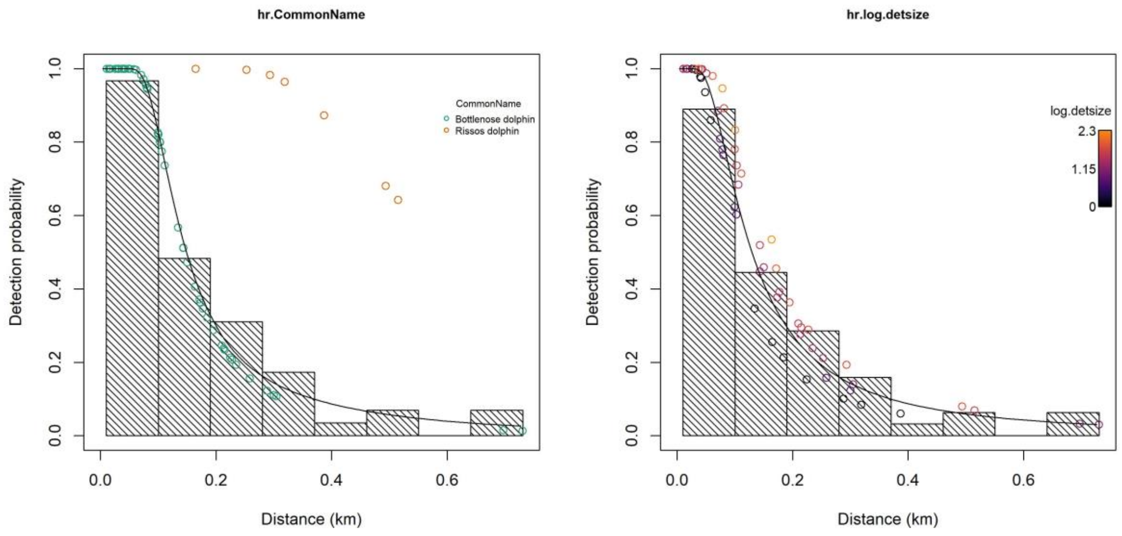


Figure C-151. Detection functions of the individual covariates.

2.15.5. Unidentified dolphin - Unidentified small dolphin

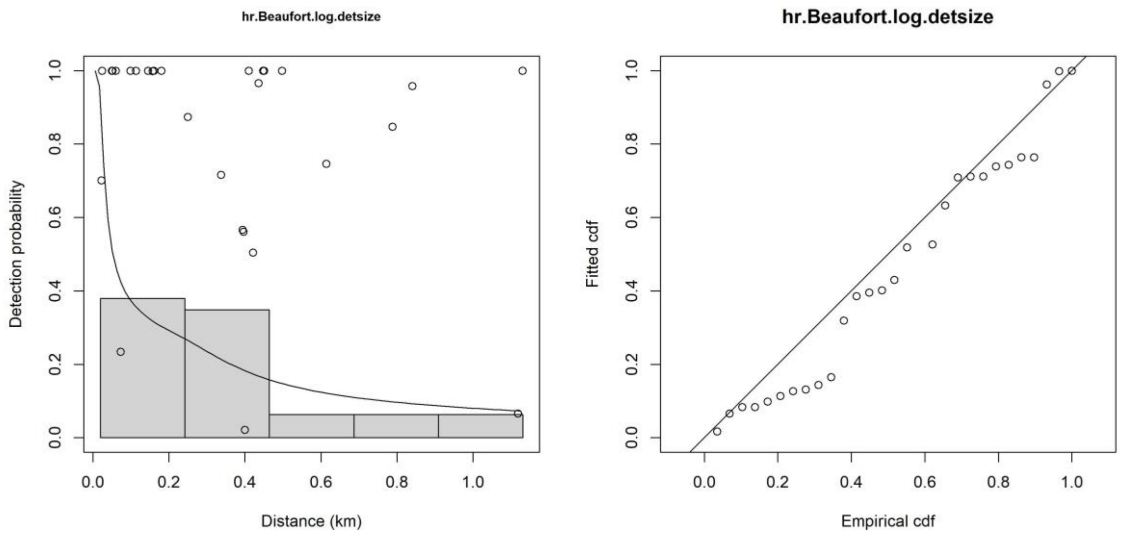


Figure C-152. Plot of the detection function (left) and QQ-Plot (right).

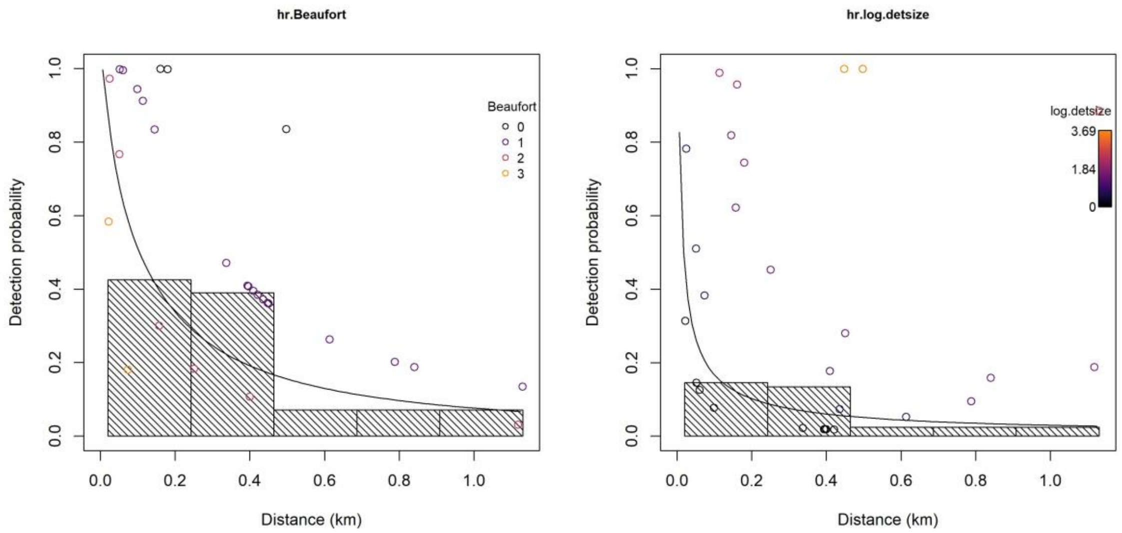


Figure C-153. Detection functions of the individual covariates.

2.15.6. Cuvier's beaked whale

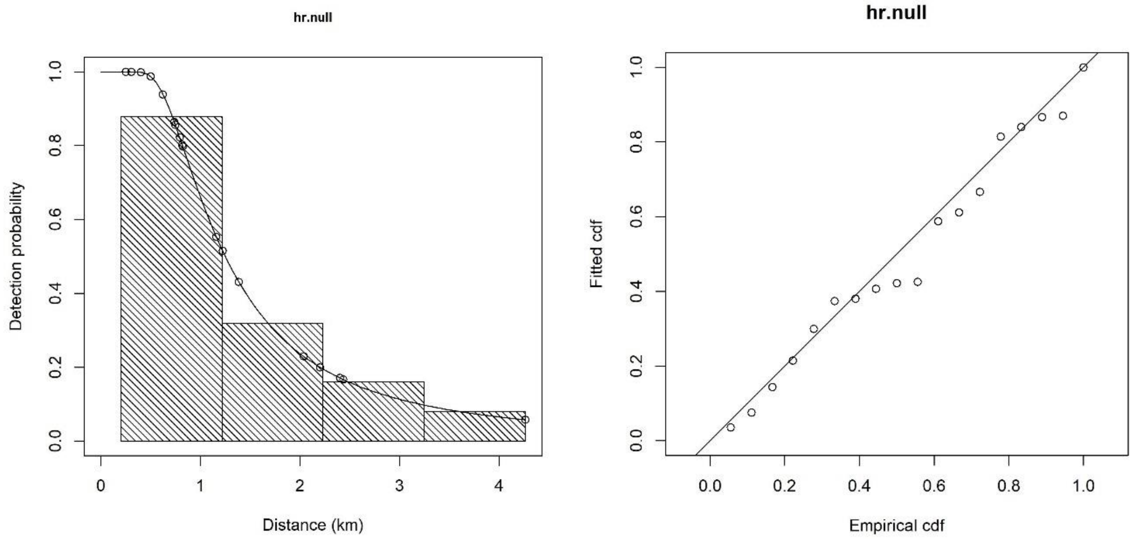


Figure C-154. Plot of the detection function (left) and QQ-Plot (right).

2.16. Platform Group G14 - None - 20 - 22m

2.16.1. Striped dolphin

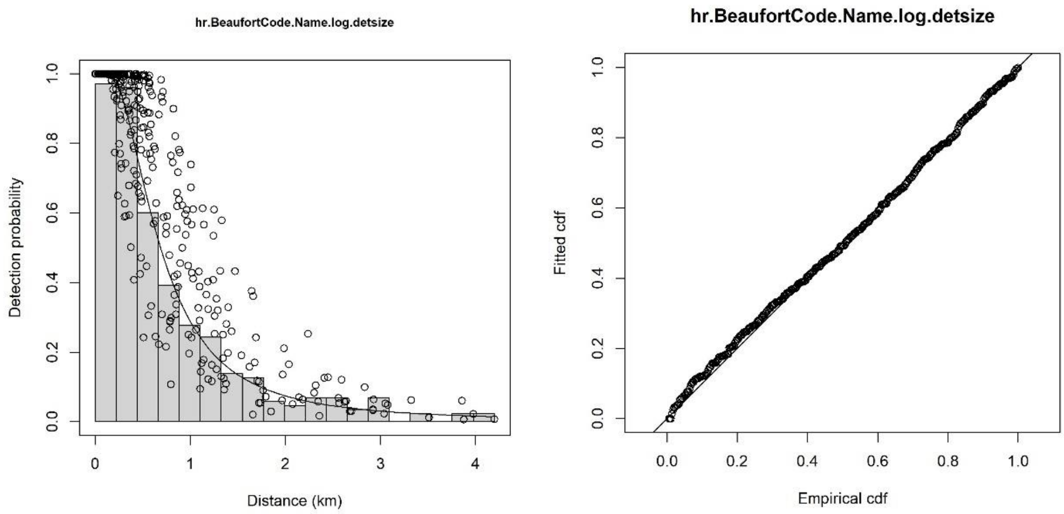


Figure C-155. Plot of the detection function (left) and QQ-Plot (right).

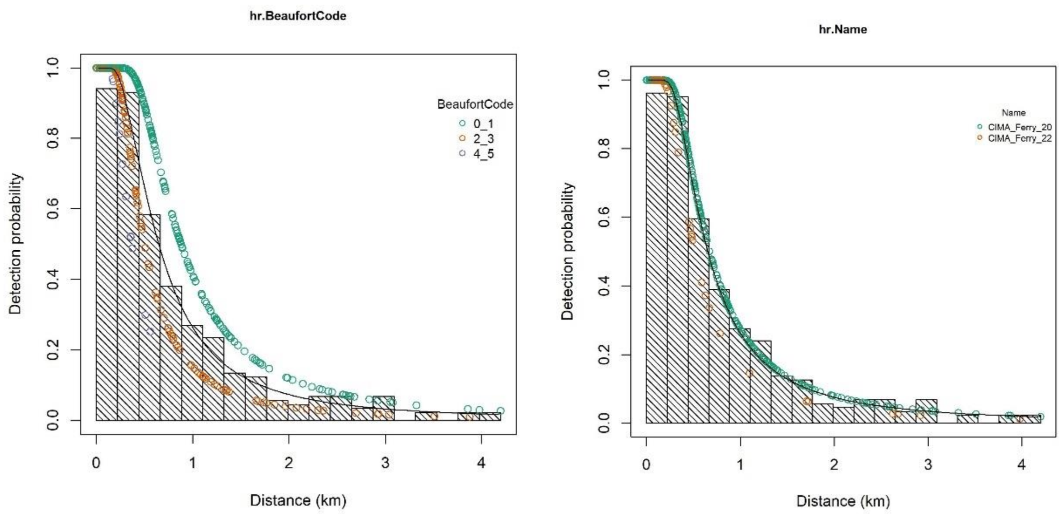


Figure C-156. Detection functions of the individual covariates.

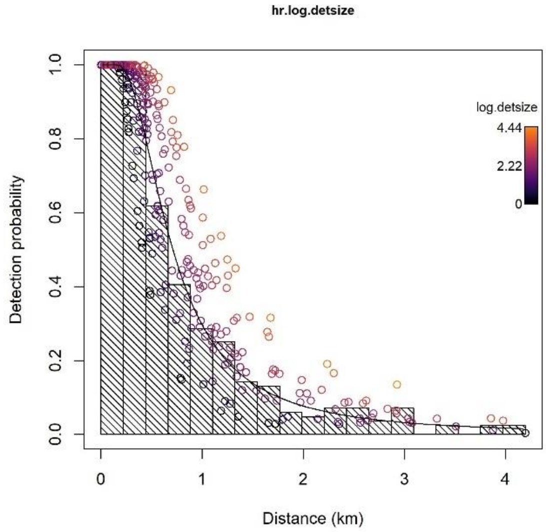


Figure C-157. Detection functions of the individual covariates.

2.17. Platform Group G14 - None - 20m

2.17.1. Fin whale

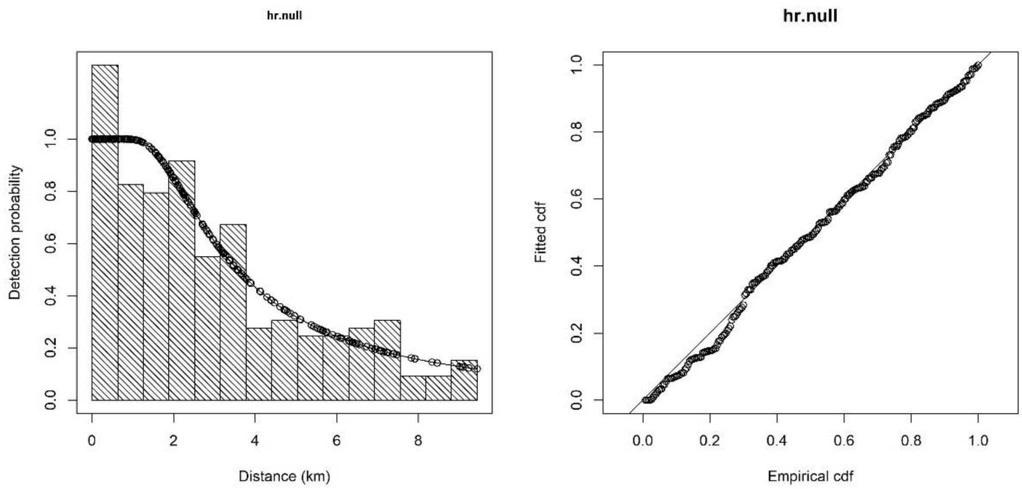


Figure C-158. Plot of the detection function (left) and QQ-Plot (right).

2.18. Platform Group G14 - None - 24 - 25m

2.18.1. Striped dolphin

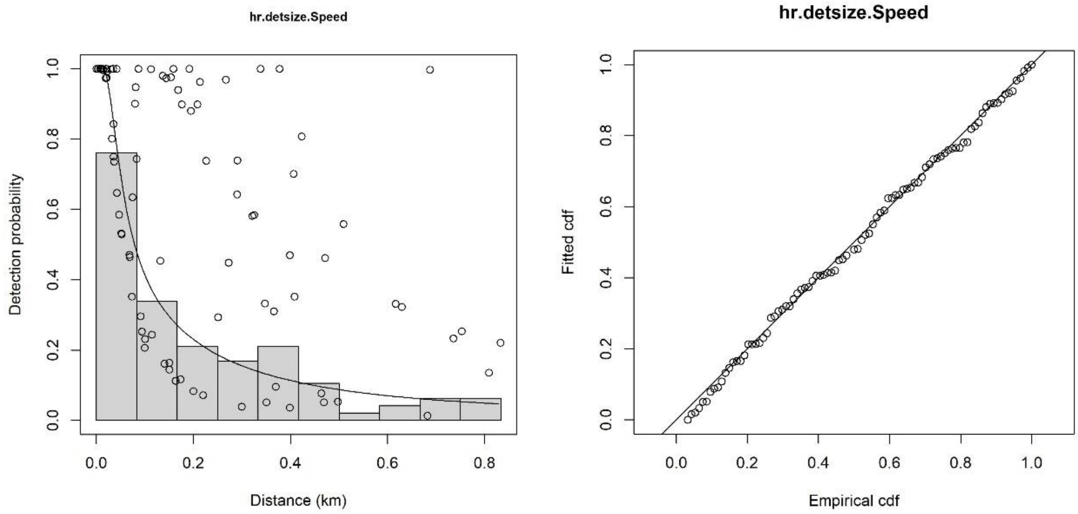


Figure C-159. Plot of the detection function (left) and QQ-Plot (right).

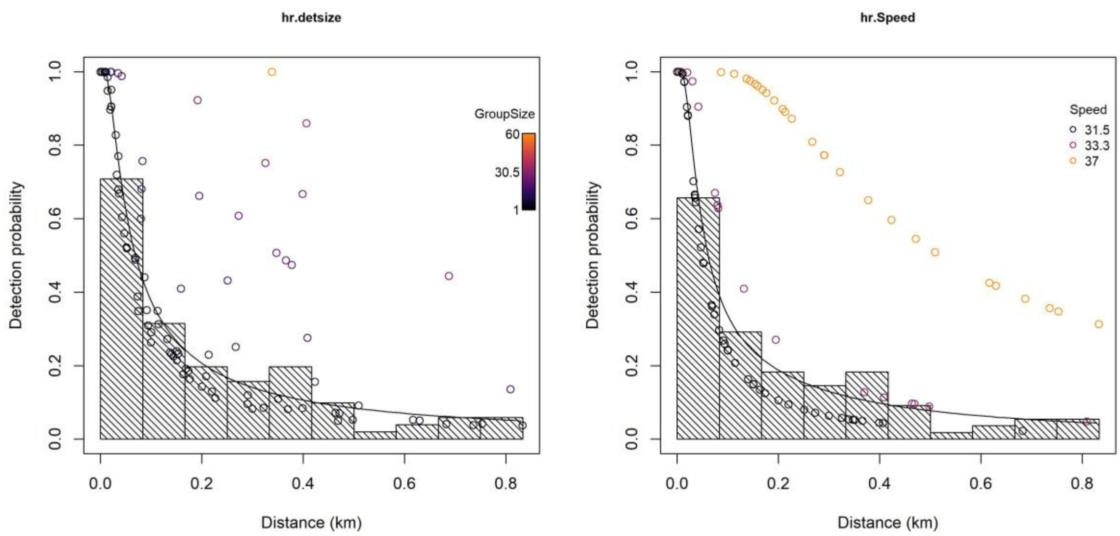


Figure C-160. Detection functions of the individual covariates.

2.19. Platform Group G14 - None - Carbonara

2.19.1. Striped dolphin

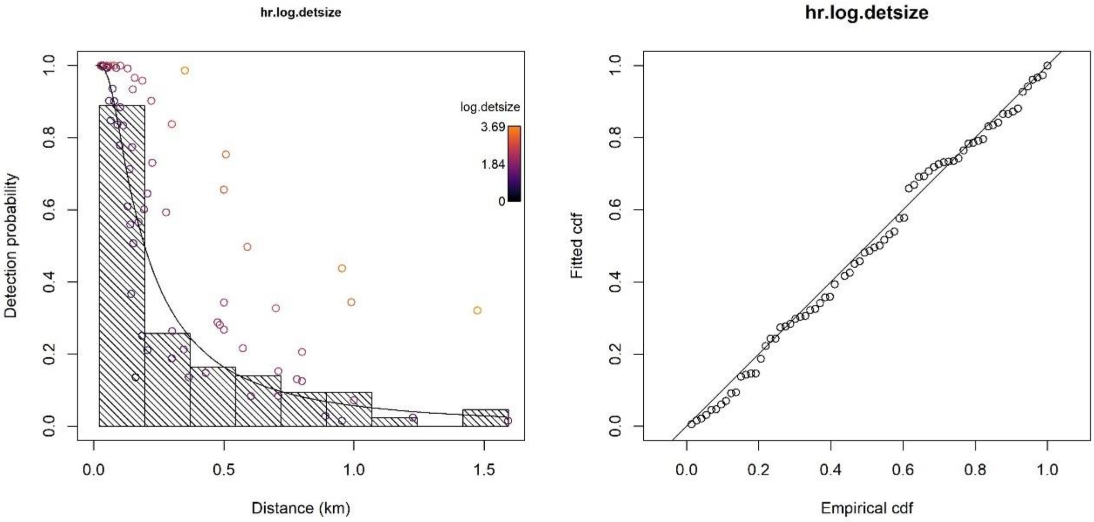


Figure C-161. Plot of the detection function (left) and QQ-Plot (right).

2.20. Platform Group G14 - None - no20m

2.20.1. Fin whale

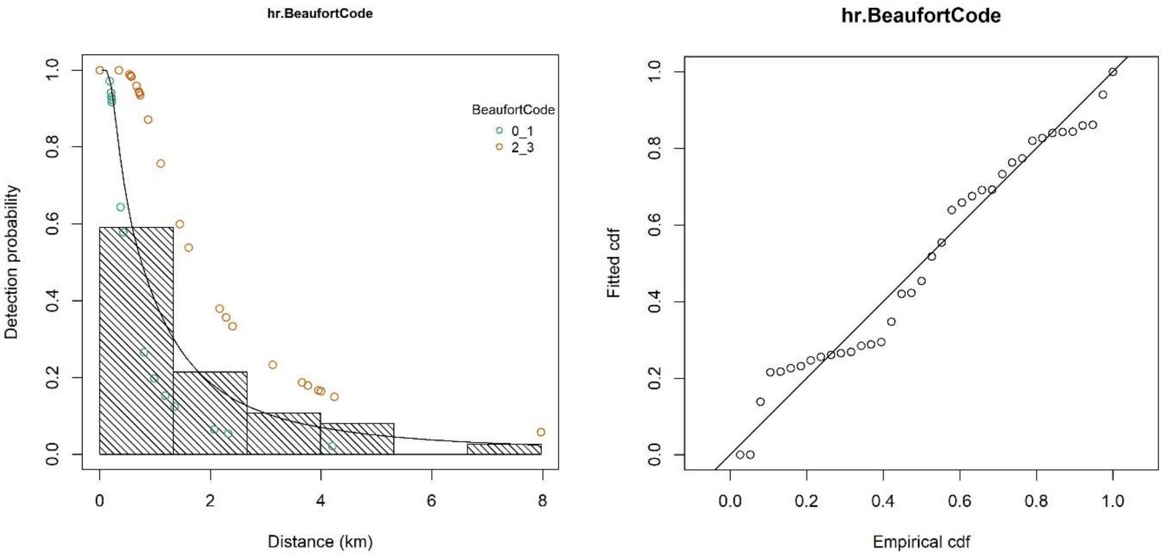


Figure C-162. Plot of the detection function (left) and QQ-Plot (right).

2.21. Platform Group G14 - None - Uni_Barcelona

2.21.1. Striped dolphin

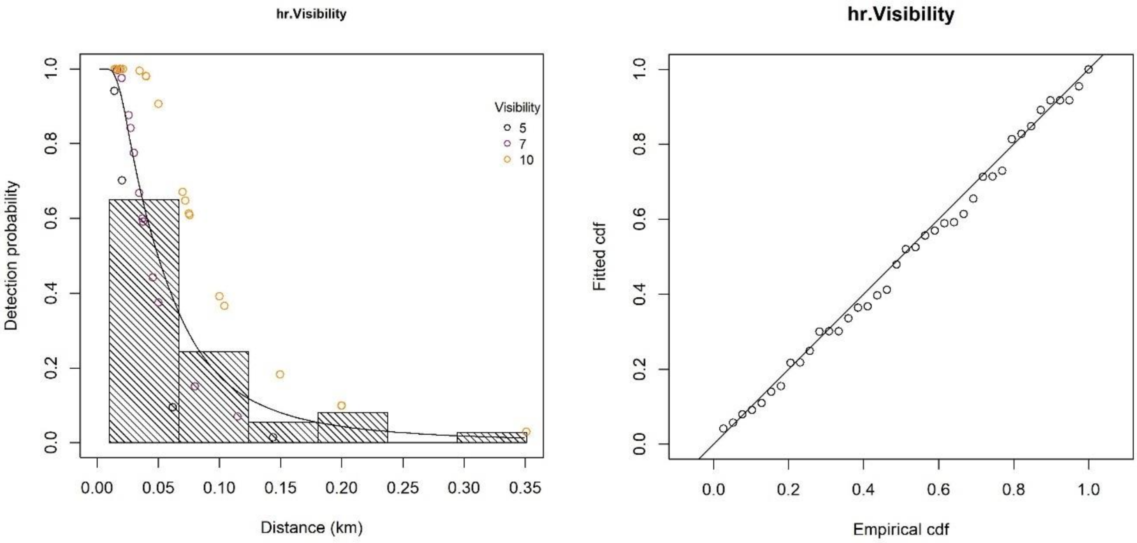


Figure C-163. Plot of the detection function (left) and QQ-Plot (right).

2.22. Platform Group G14 - None - Uni_Palermo

2.22.1. Striped dolphin

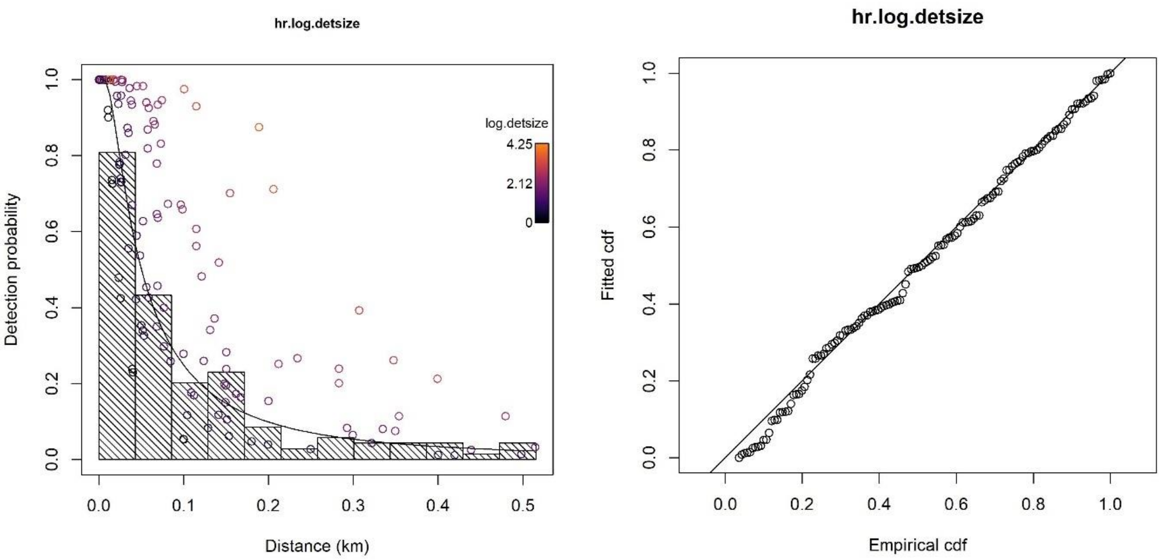


Figure C-164. Plot of the detection function (left) and QQ-Plot (right).

2.23. Platform Group G15 - None

2.23.1. Fin whale

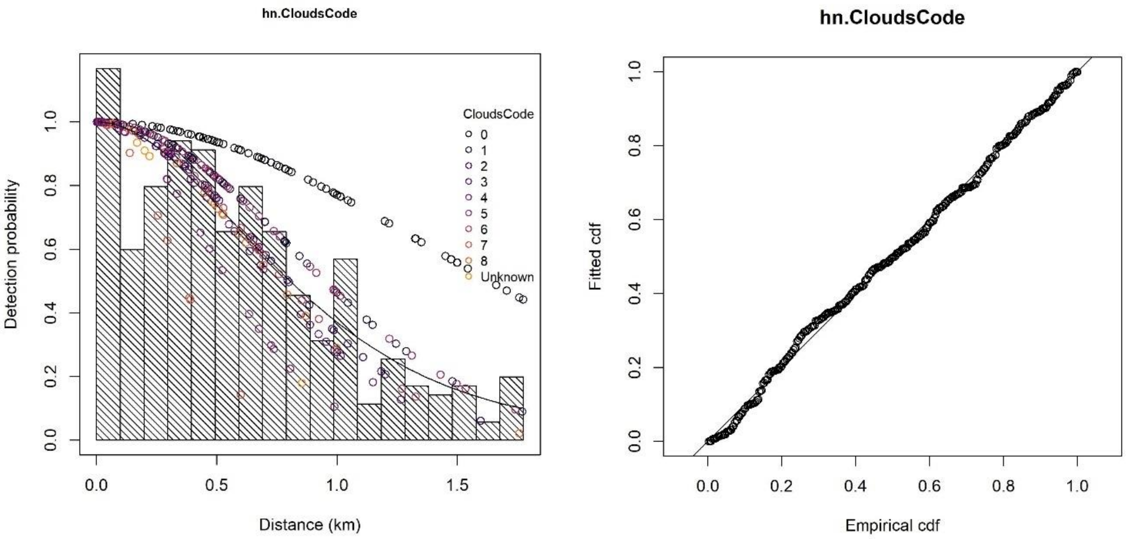


Figure C-165. Plot of the detection function (left) and QQ-Plot (right).

2.23.2. Sperm whale

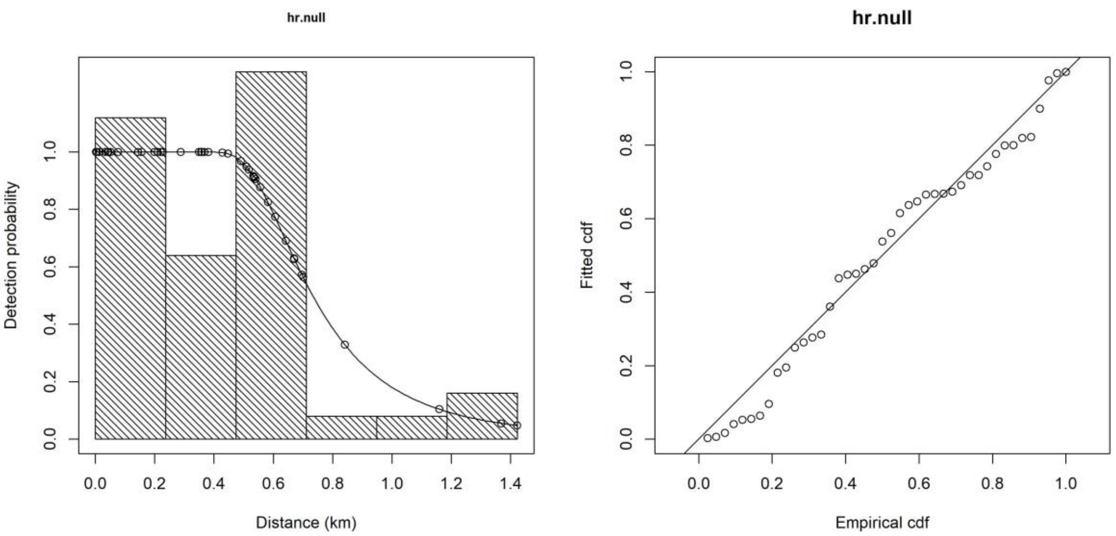


Figure C-166. Plot of the detection function (left) and QQ-Plot (right).

2.23.3. Striped dolphin

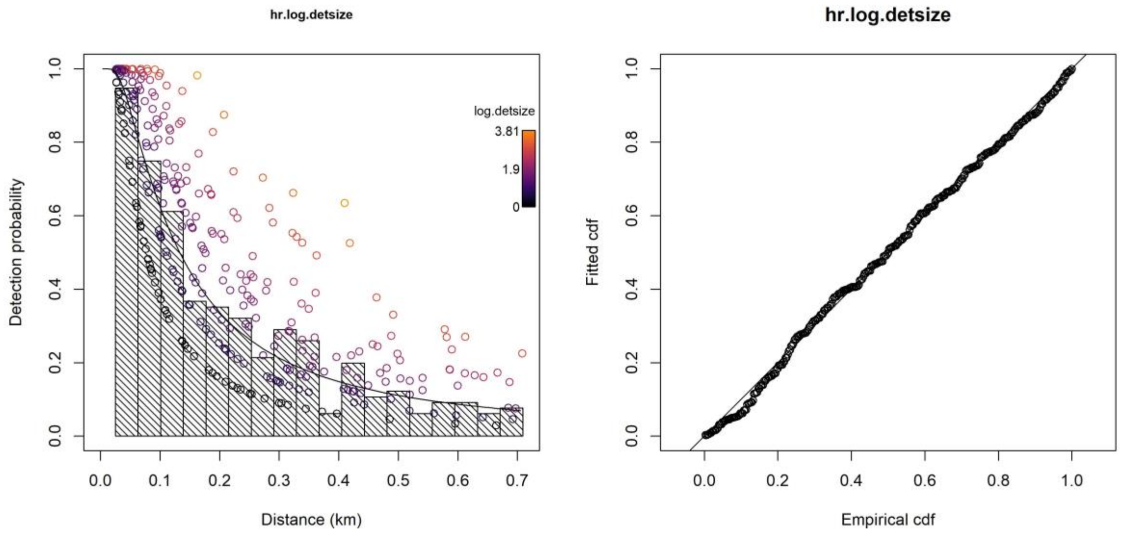


Figure C-167. Plot of the detection function (left) and QQ-Plot (right).

2.23.4. Striped dolphin - Common dolphin

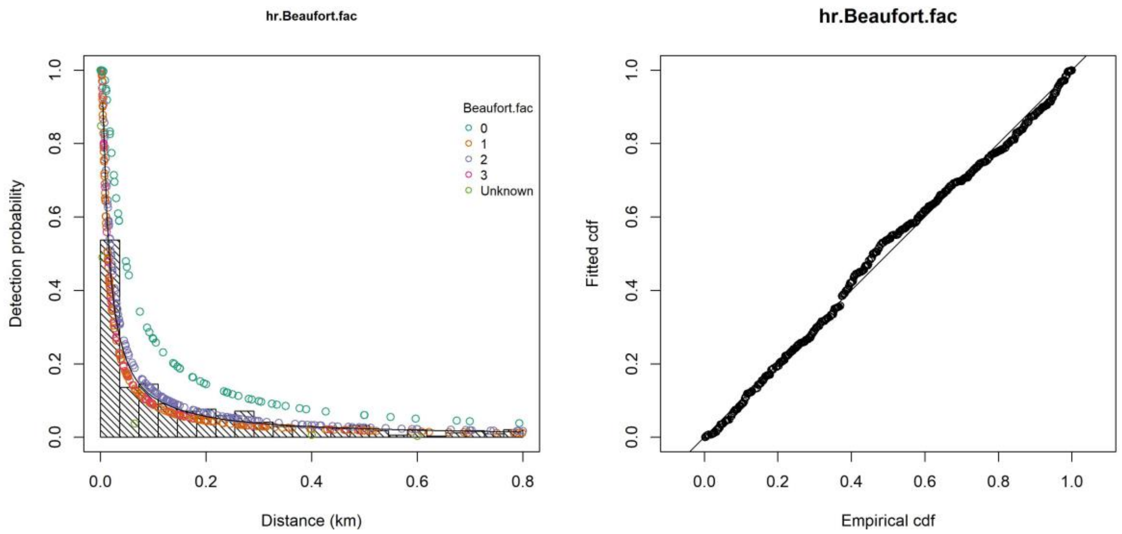


Figure C-168. Plot of the detection function (left) and QQ-Plot (right).

2.23.5. Bottlenose dolphin

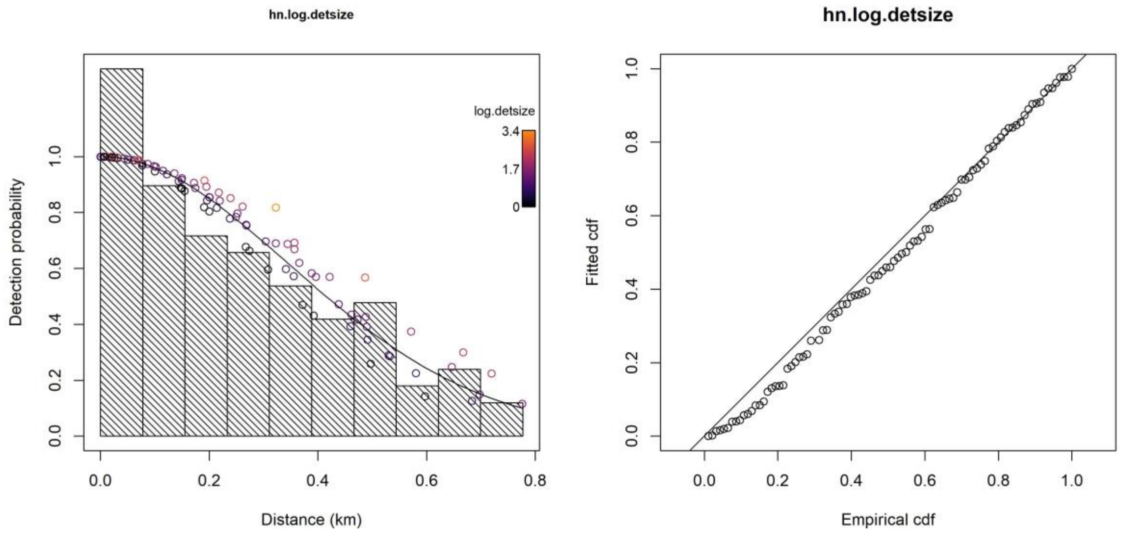


Figure C-169. Plot of the detection function (left) and QQ-Plot (right).

2.23.6. Bottlenose dolphin - Risso's dolphin

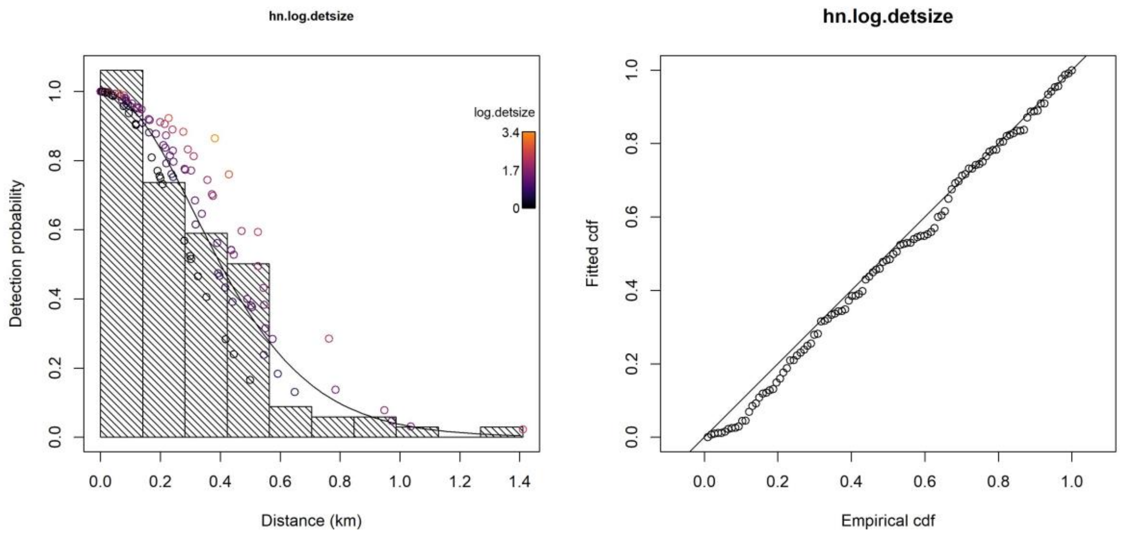


Figure C-170. Plot of the detection function (left) and QQ-Plot (right).

2.23.7. Unidentified small dolphin

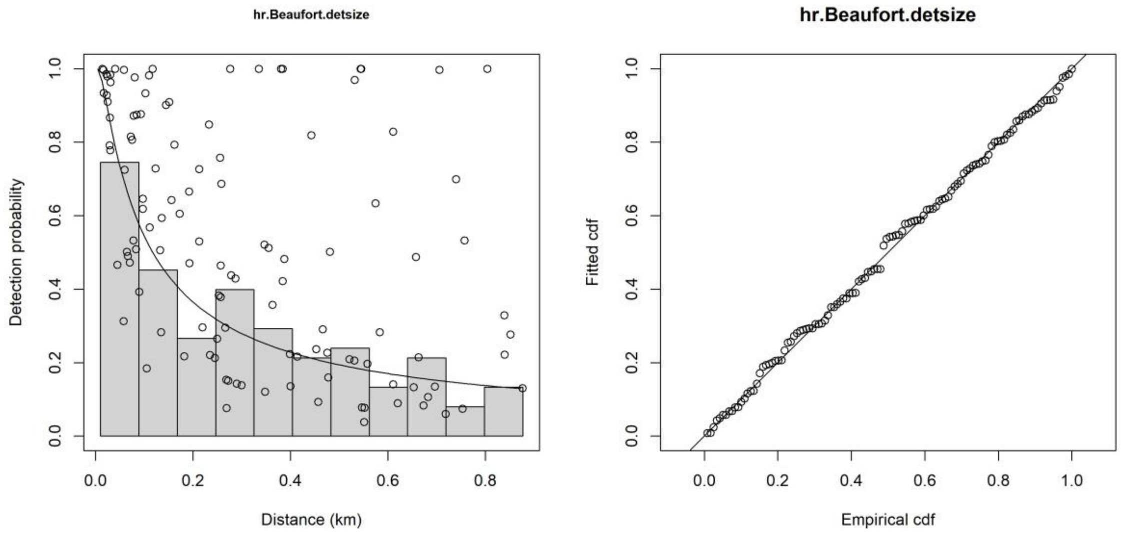


Figure C-171. Plot of the detection function (left) and QQ-Plot (right).

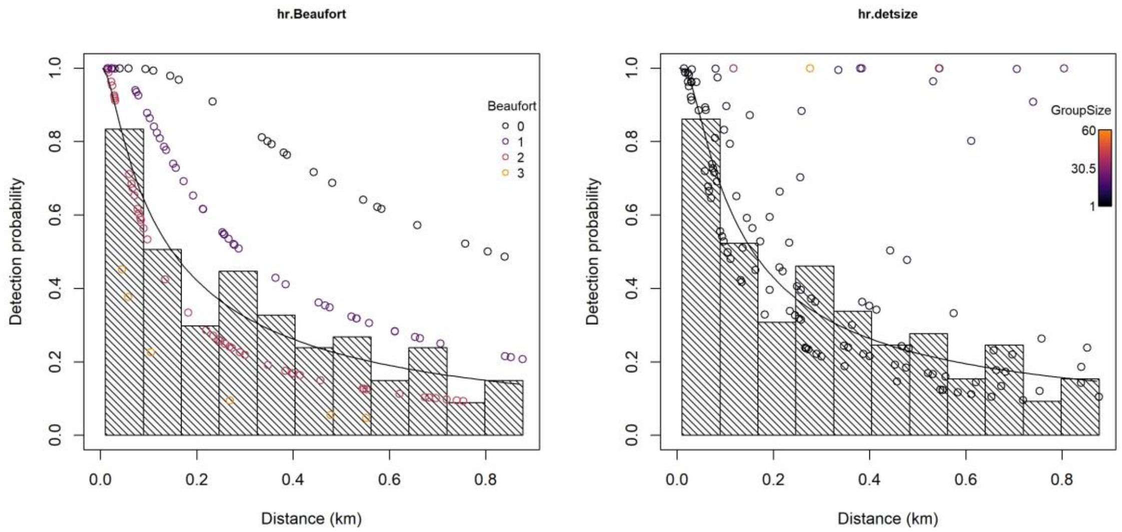


Figure C-172. Detection functions of the individual covariates.

2.23.8. Cuvier's beaked whale

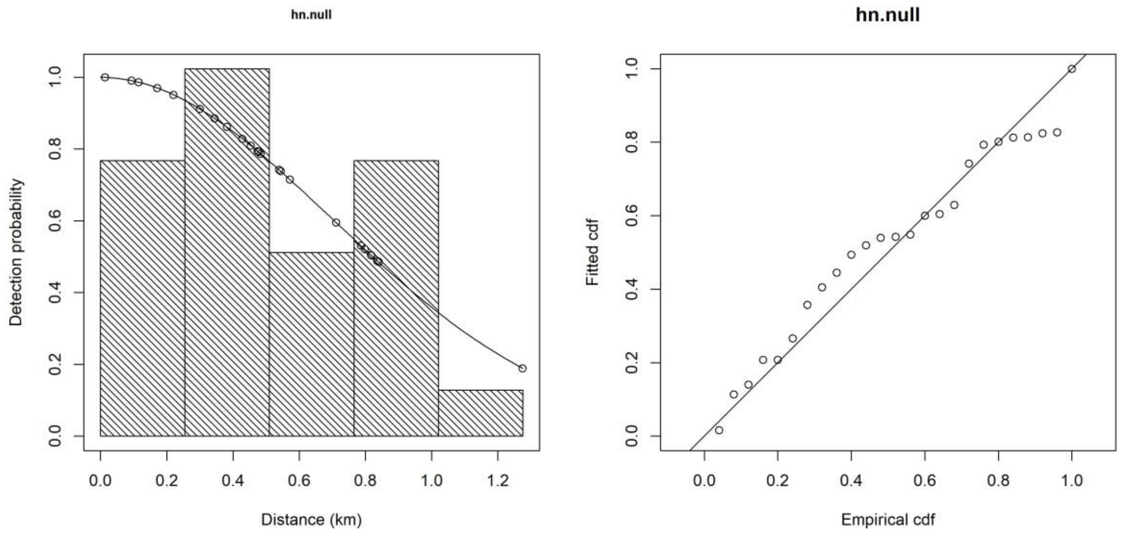


Figure C-173. Plot of the detection function (left) and QQ-Plot (right).

2.24. Platform Group G16 - All

2.24.1. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - Rough - toothed dolphin - False killer whale

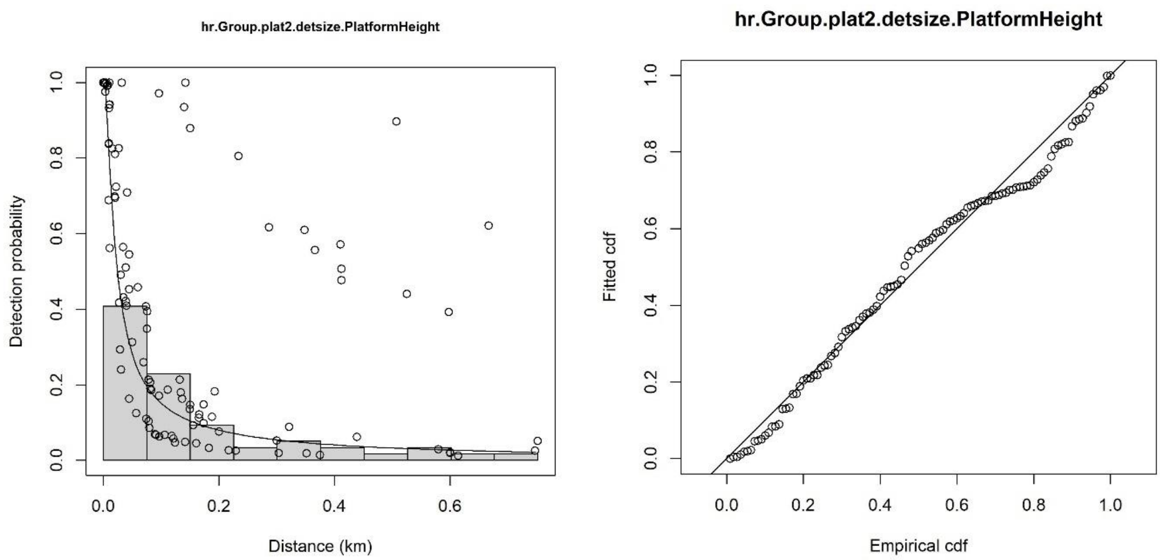


Figure C-174. Plot of the detection function (left) and QQ-Plot (right).

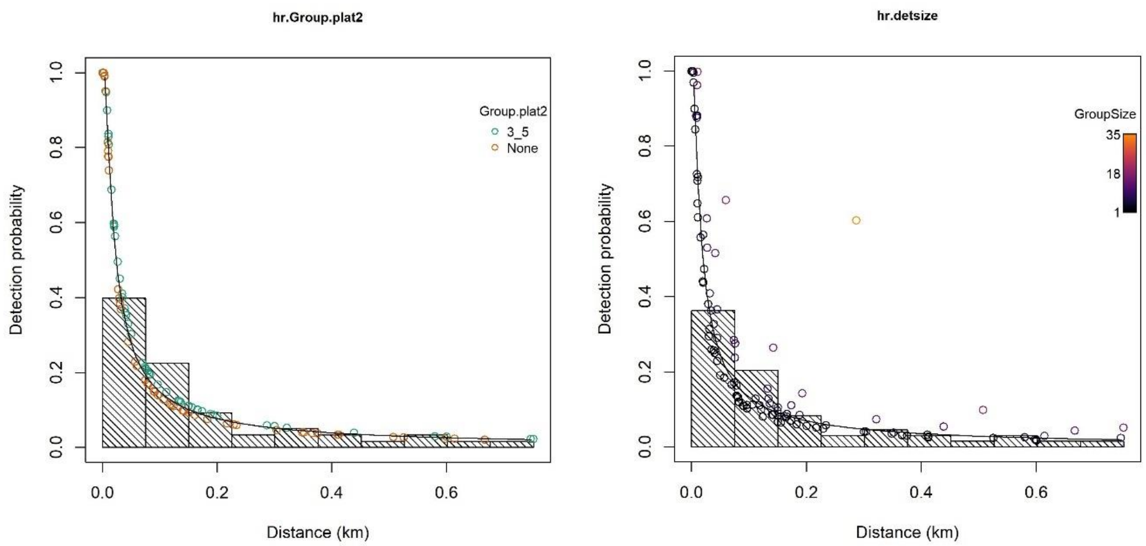


Figure C-175. Detection functions of the individual covariates.

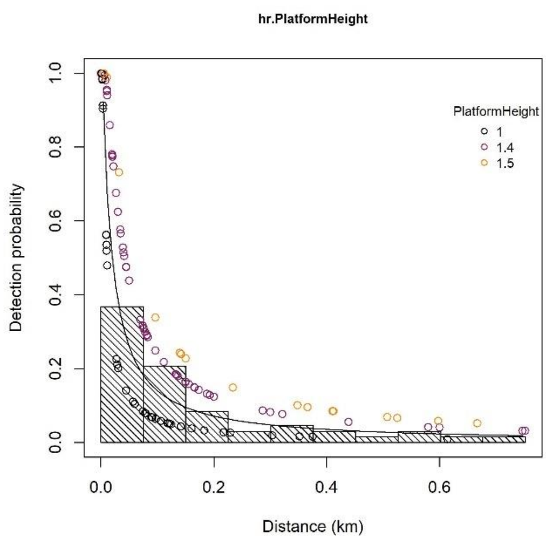


Figure C-176. Detection functions of the individual covariates.

2.25. Platform Group G16 - None

2.25.1. Common dolphin

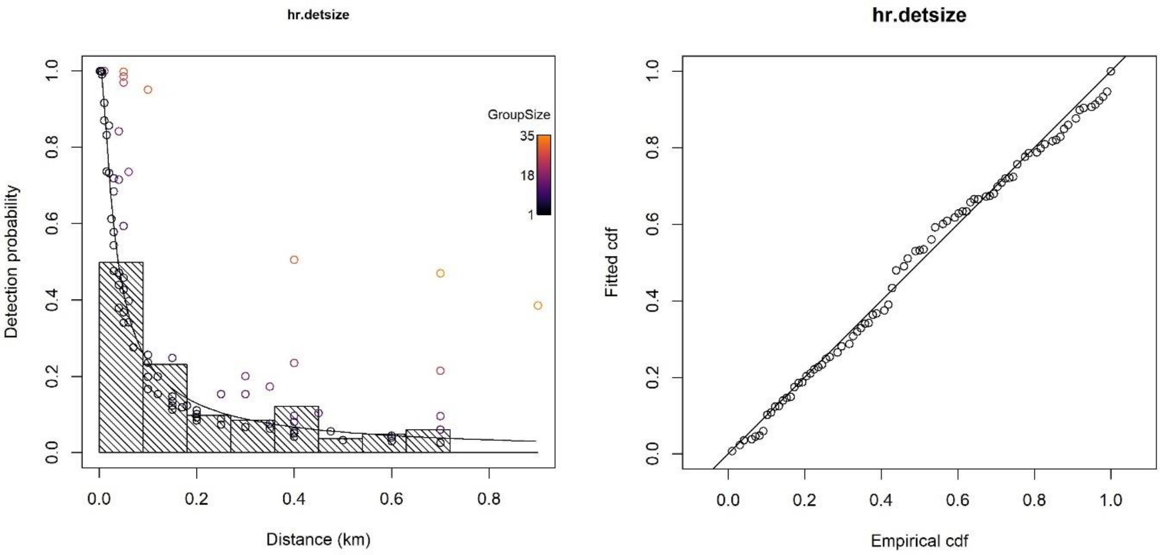


Figure C-177. Plot of the detection function (left) and QQ-Plot (right).

2.25.2. Harbor porpoise

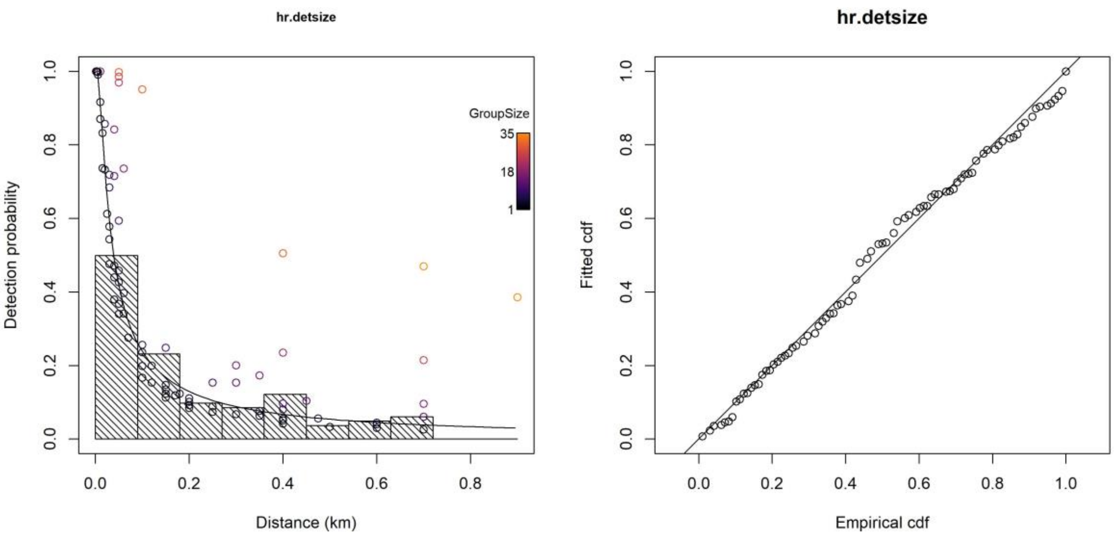


Figure C-178. Plot of the detection function (left) and QQ-Plot (right).

2.25.3. Unidentified beaked whale

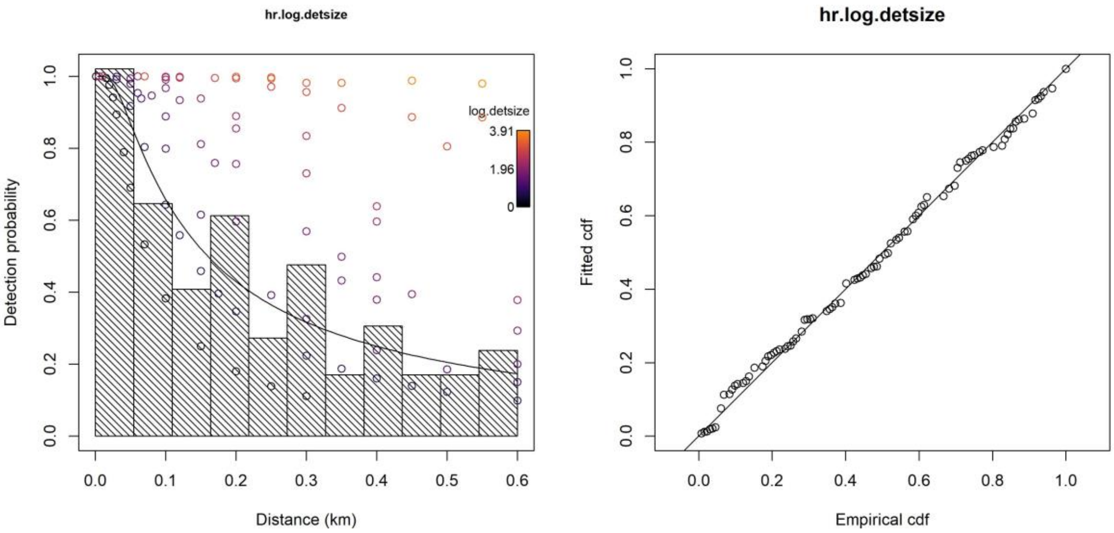


Figure C-179. Plot of the detection function (left) and QQ-Plot (right).

2.25.4. Bottlenose dolphin - Common dolphin

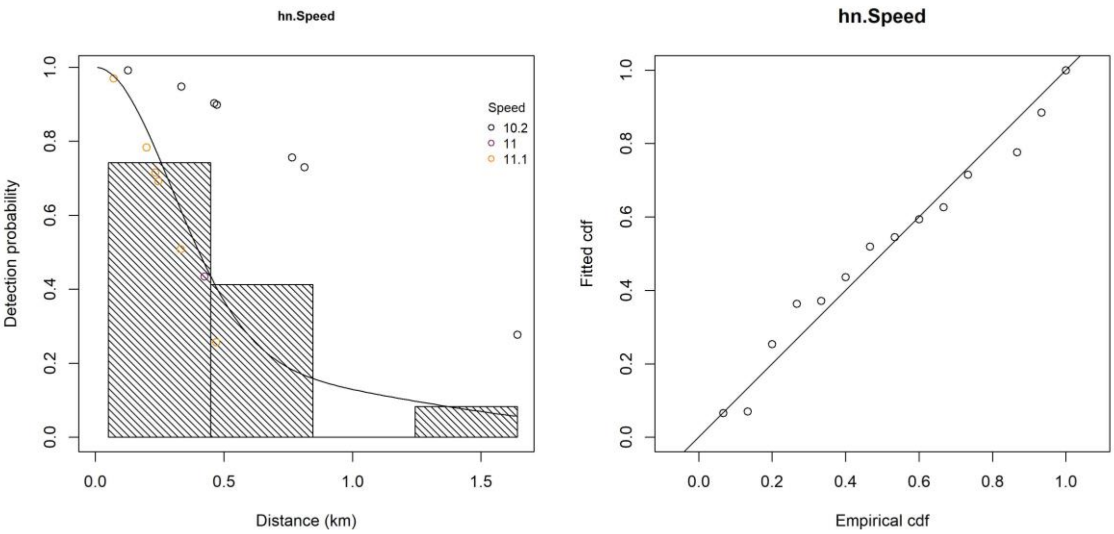


Figure C-180. Plot of the detection function (left) and QQ-Plot (right).

2.26. Platform Group G17 - None

2.26.1. Common dolphin

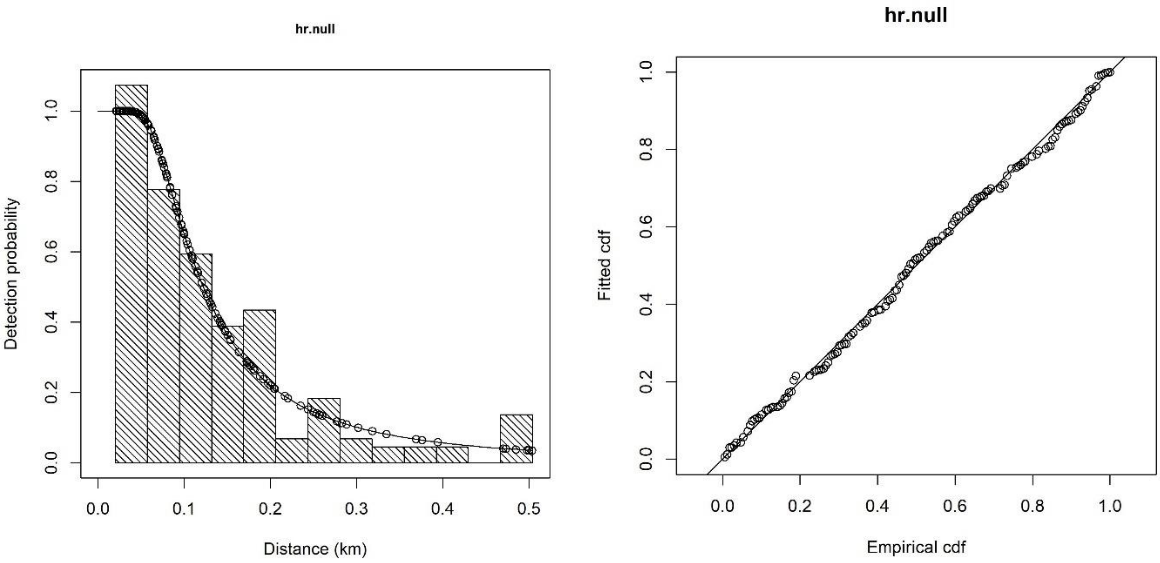


Figure C-181. Plot of the detection function (left) and QQ-Plot (right).

2.26.2. Harbor porpoise

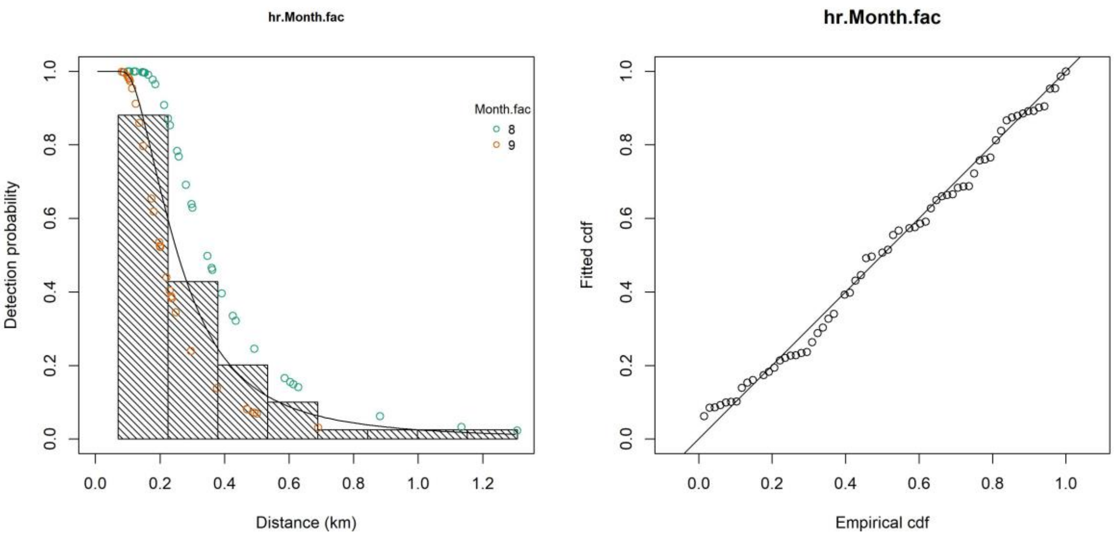


Figure C-182. Plot of the detection function (left) and QQ-Plot (right).

2.27. Platform Group G2 - 10_11

2.27.1. Striped dolphin

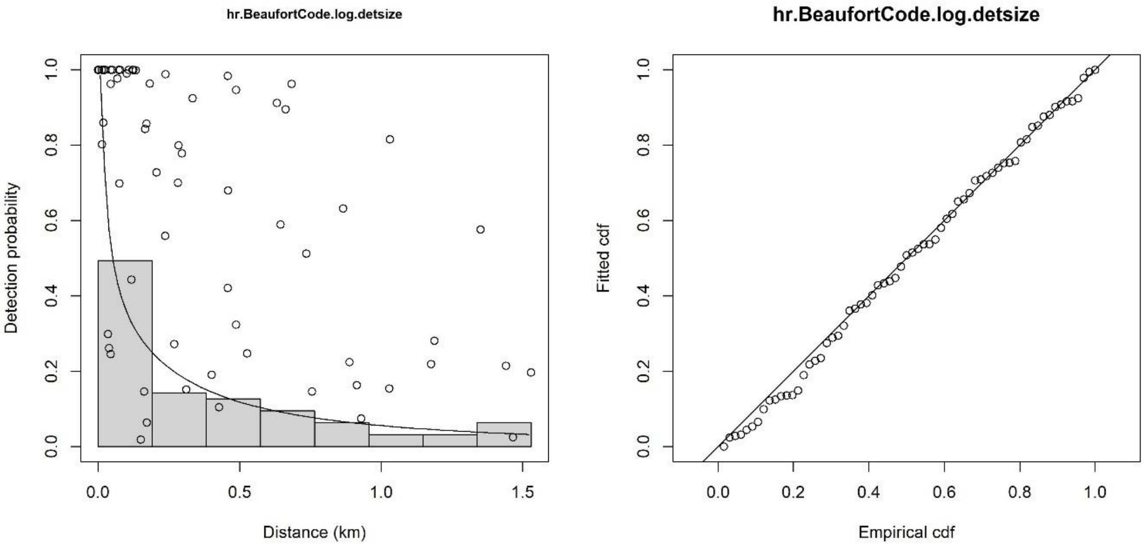


Figure C-183. Plot of the detection function (left) and QQ-Plot (right).

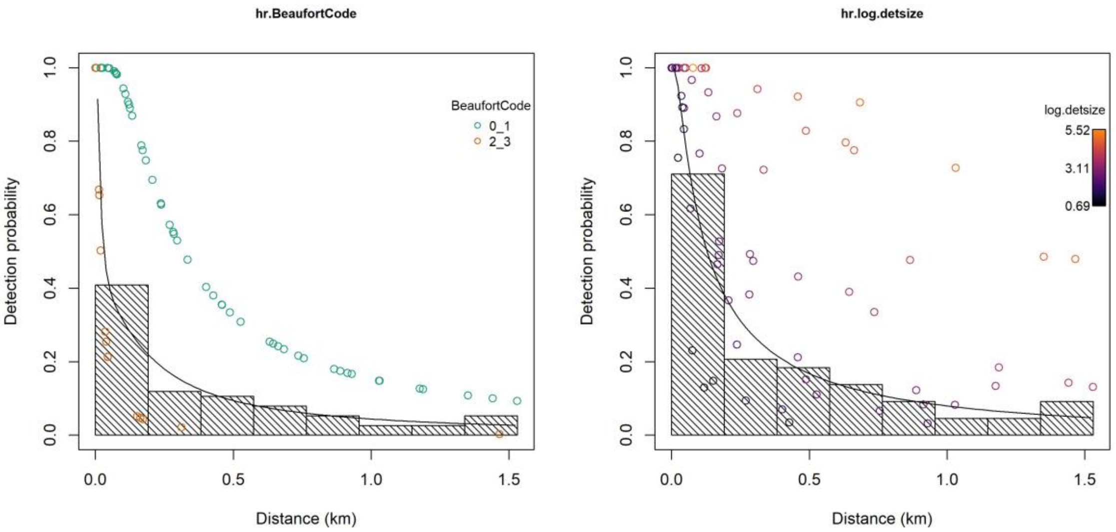


Figure C-184. Detection functions of the individual covariates.

2.27.2. Striped dolphin - Common dolphin

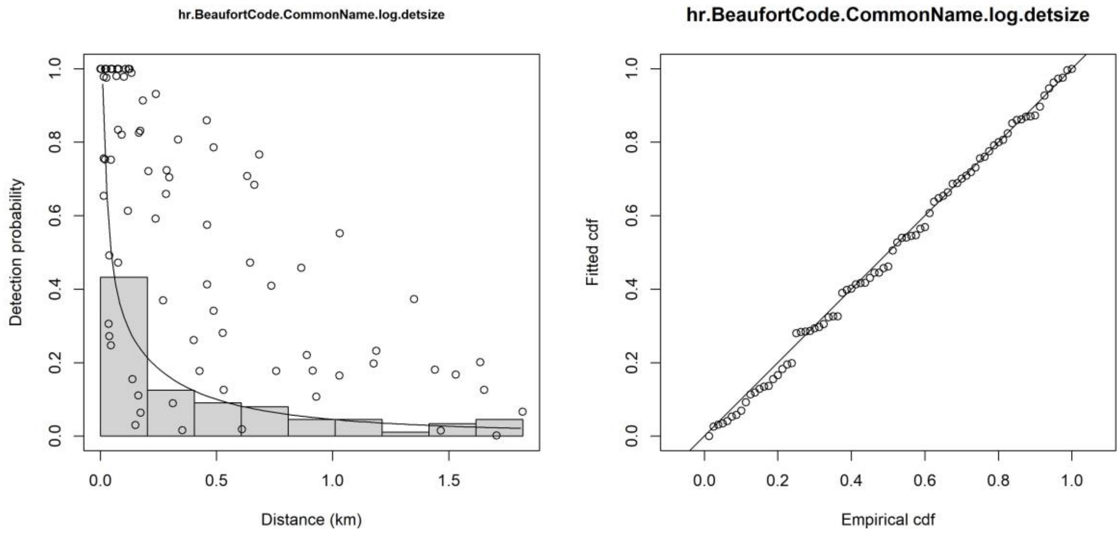


Figure C-185. Plot of the detection function (left) and QQ-Plot (right).

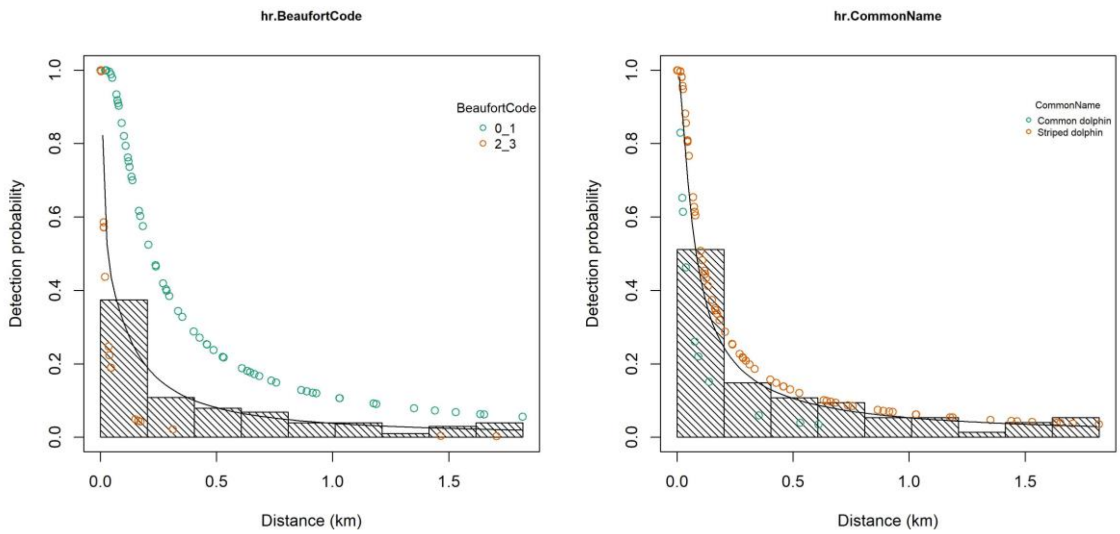


Figure C-186. Detection functions of the individual covariates.

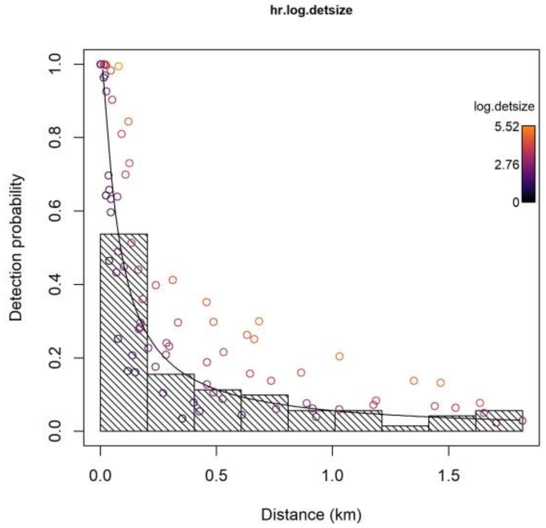


Figure C-187. Detection functions of the individual covariates.

2.27.3. Striped dolphin - Common dolphin - Unidentified dolphin

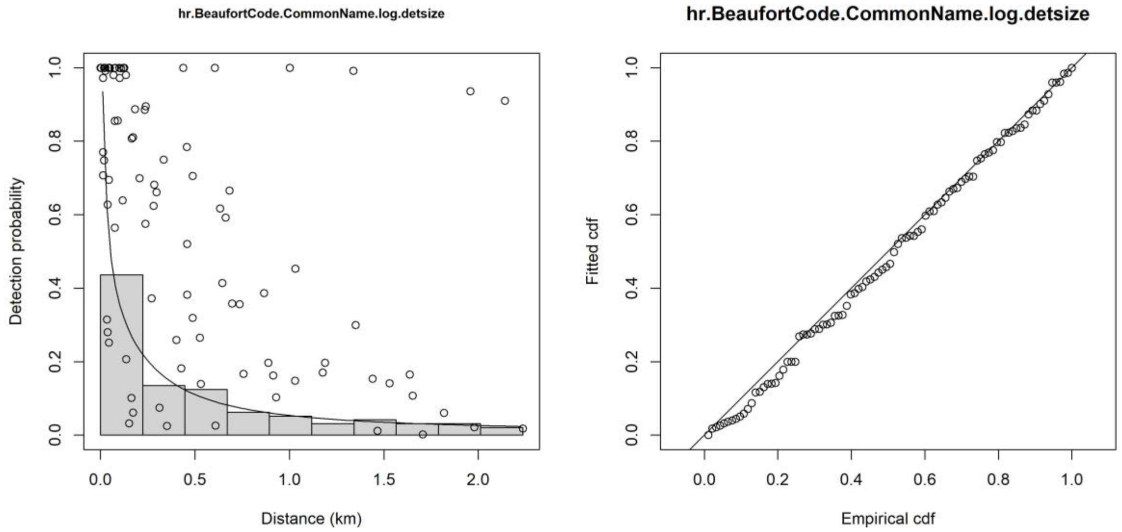


Figure C-188. Plot of the detection function (left) and QQ-Plot (right).

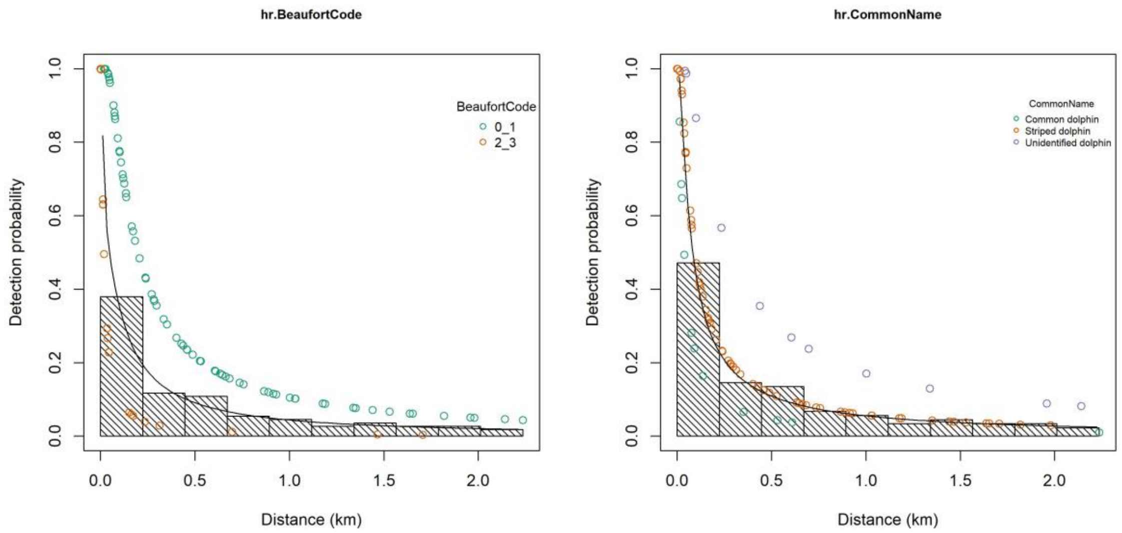


Figure C-189. Detection functions of the individual covariates.

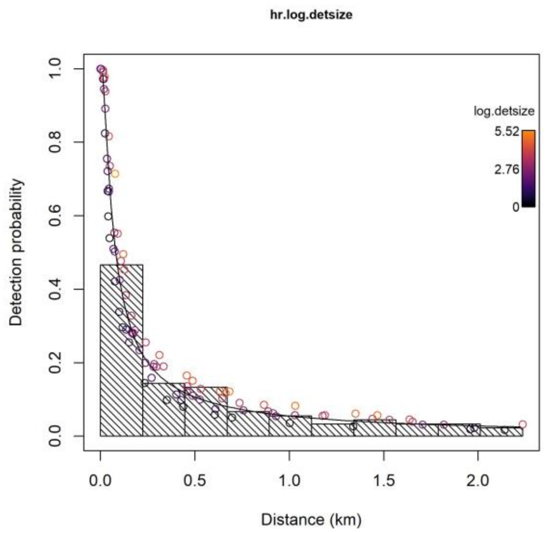


Figure C-190. Detection functions of the individual covariates.

2.27.4. Bottlenose dolphin - Risso's dolphin

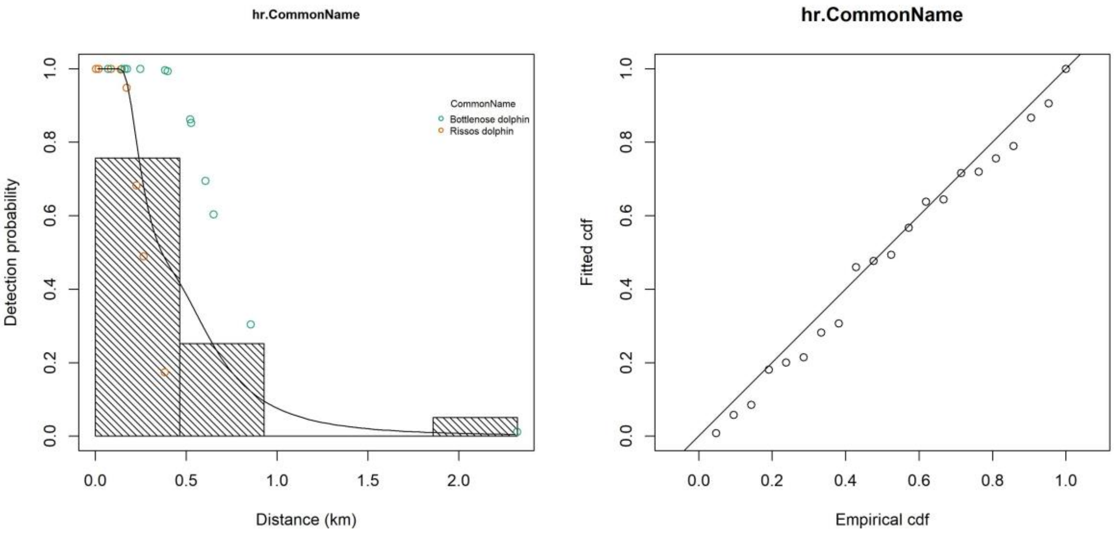


Figure C-191. Plot of the detection function (left) and QQ-Plot (right).

2.27.5. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

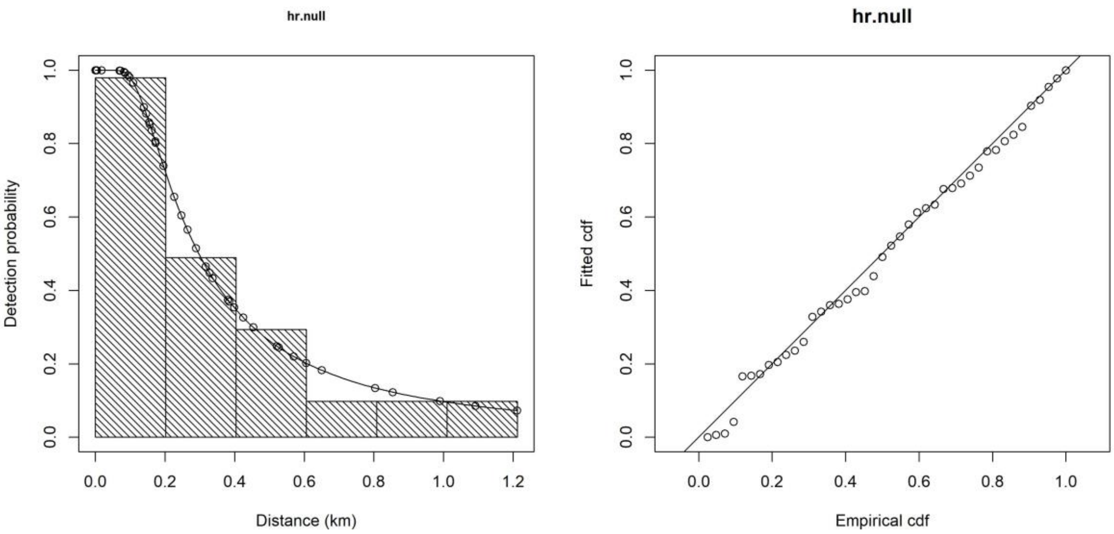


Figure C-192. Plot of the detection function (left) and QQ-Plot (right).

2.28. Platform Group G2 - 6_8

2.28.1. Common dolphin

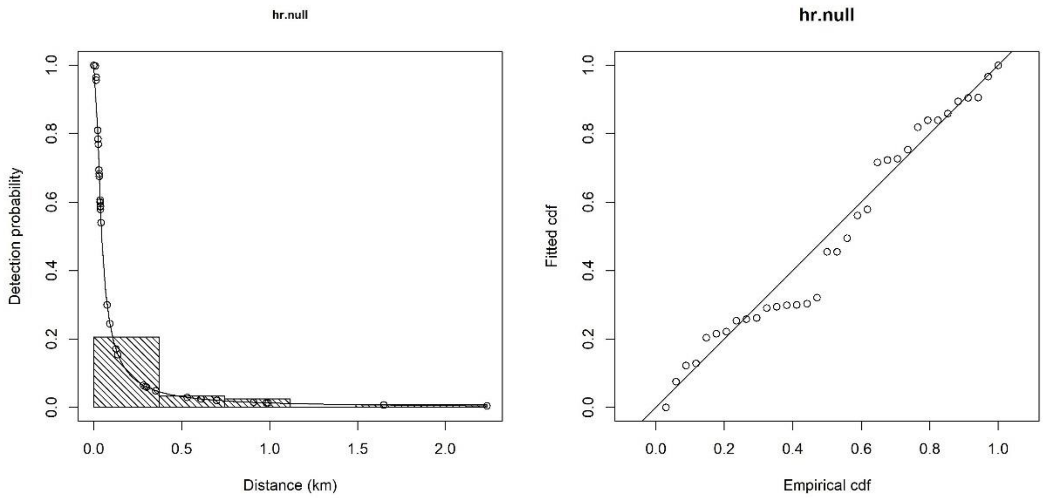


Figure C-193. Plot of the detection function (left) and QQ-Plot (right).

2.28.2. Striped dolphin

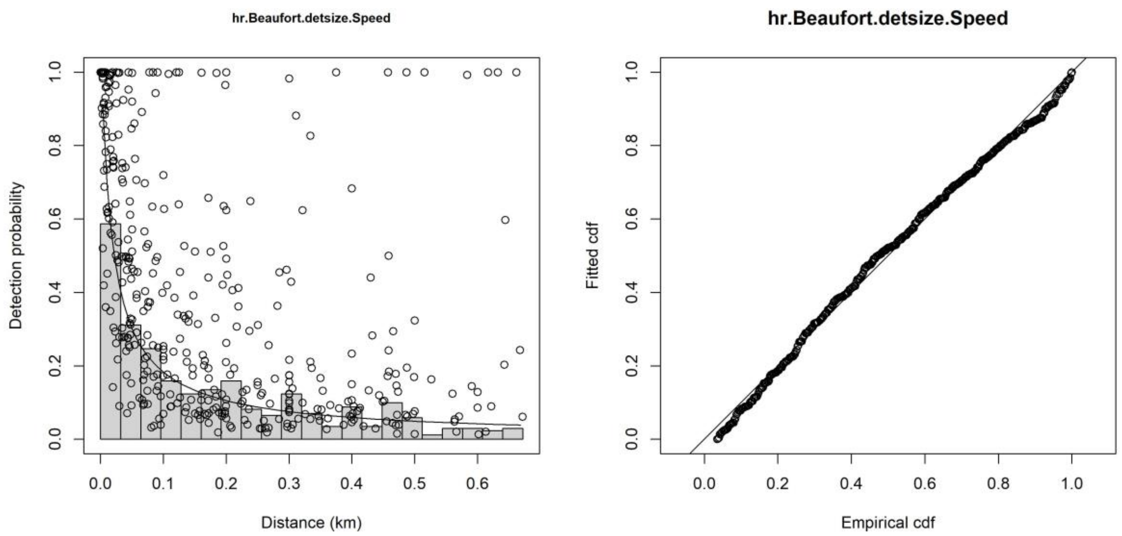


Figure C-194. Plot of the detection function (left) and QQ-Plot (right).

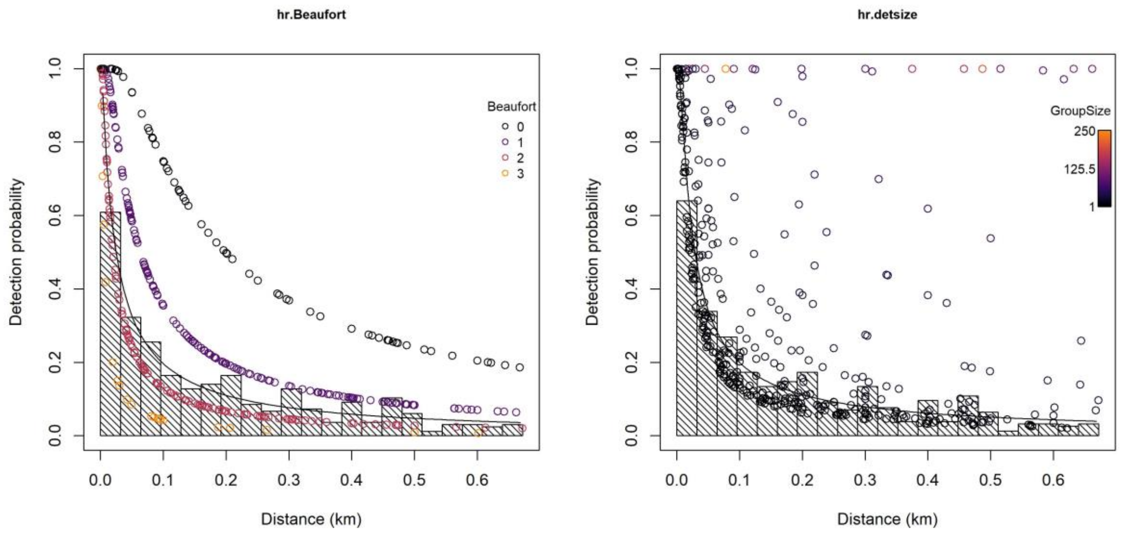


Figure C-195. Detection functions of the individual covariates.

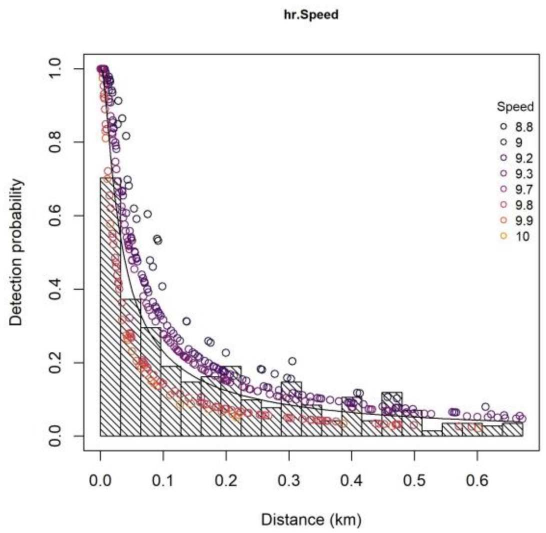


Figure C-196. Detection functions of the individual covariates.

2.29. Platform Group G2 - All

2.29.1. Fin whale

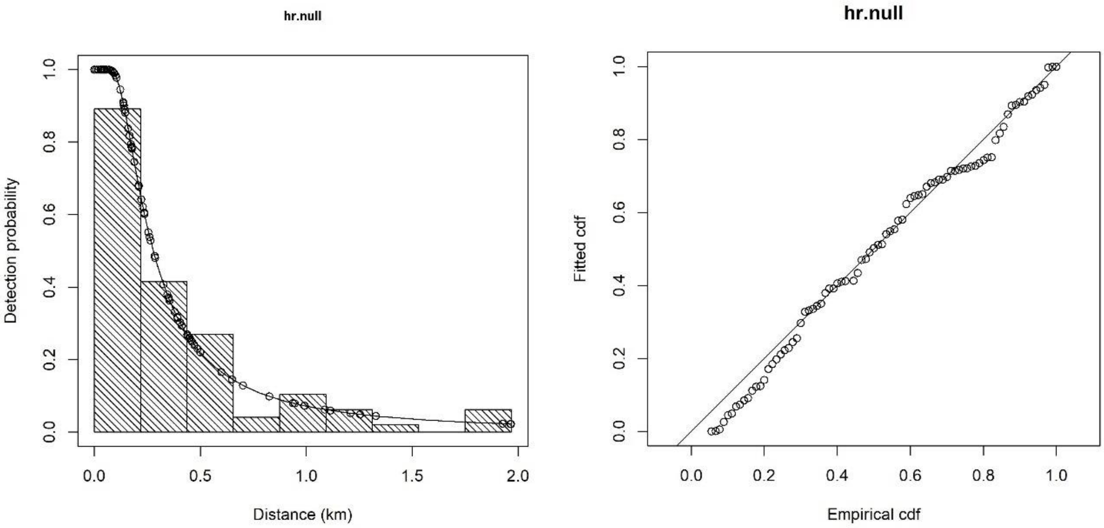


Figure C-201. Plot of the detection function (left) and QQ-Plot (right).

2.29.2. Risso's dolphin

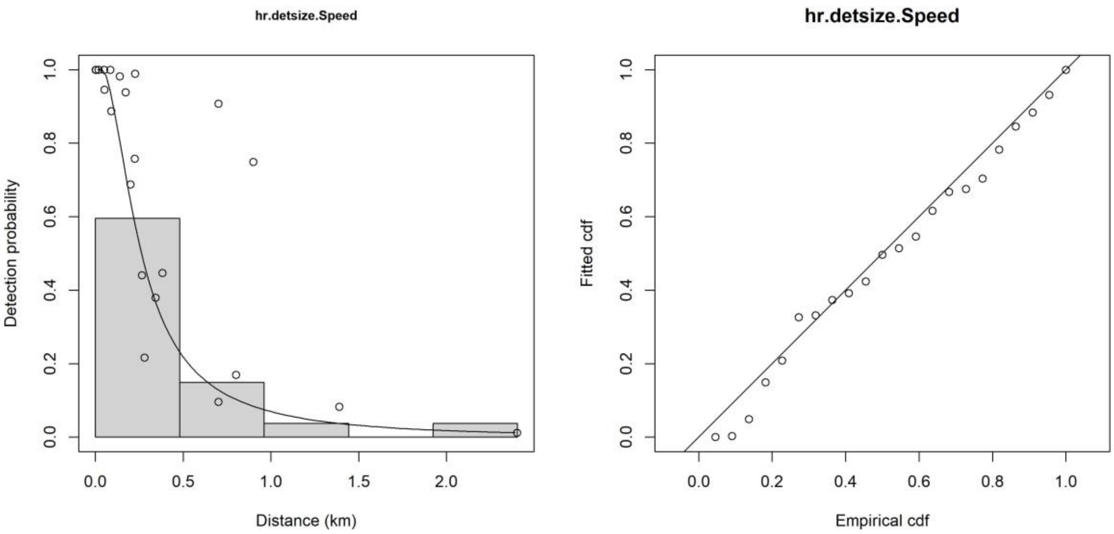


Figure C-197. Plot of the detection function (left) and QQ-Plot (right).

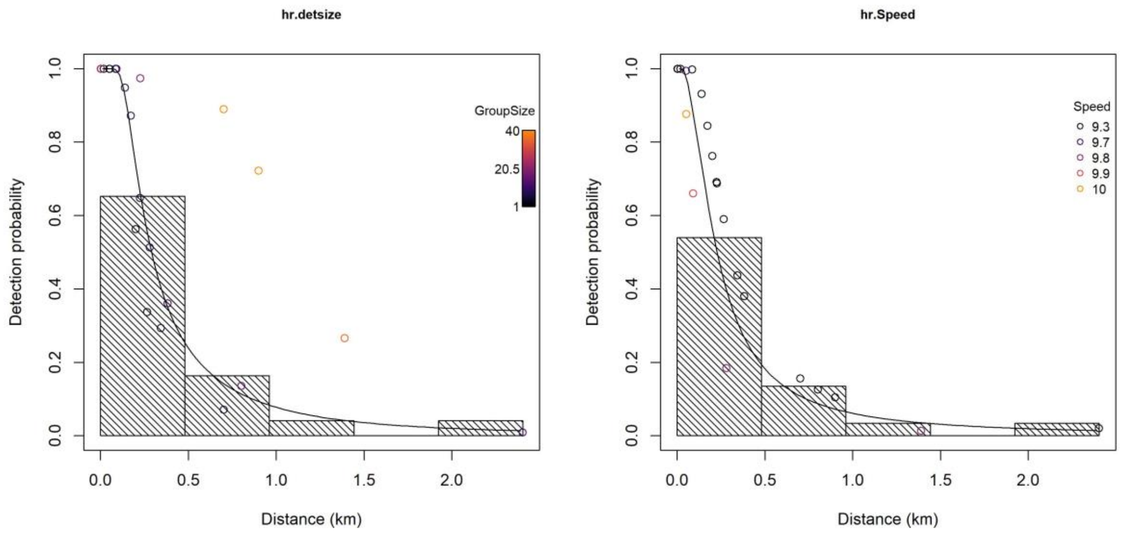


Figure C-198. Detection functions of the individual covariates.

2.29.3. Long-finned pilot whale

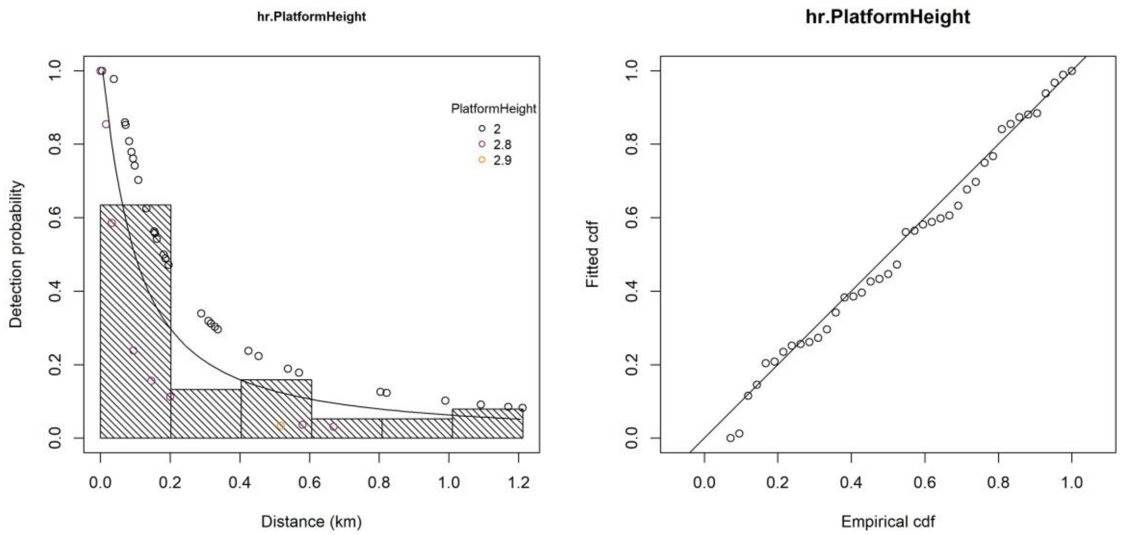


Figure C-199. Plot of the detection function (left) and QQ-Plot (right).

2.29.4. Sperm whale

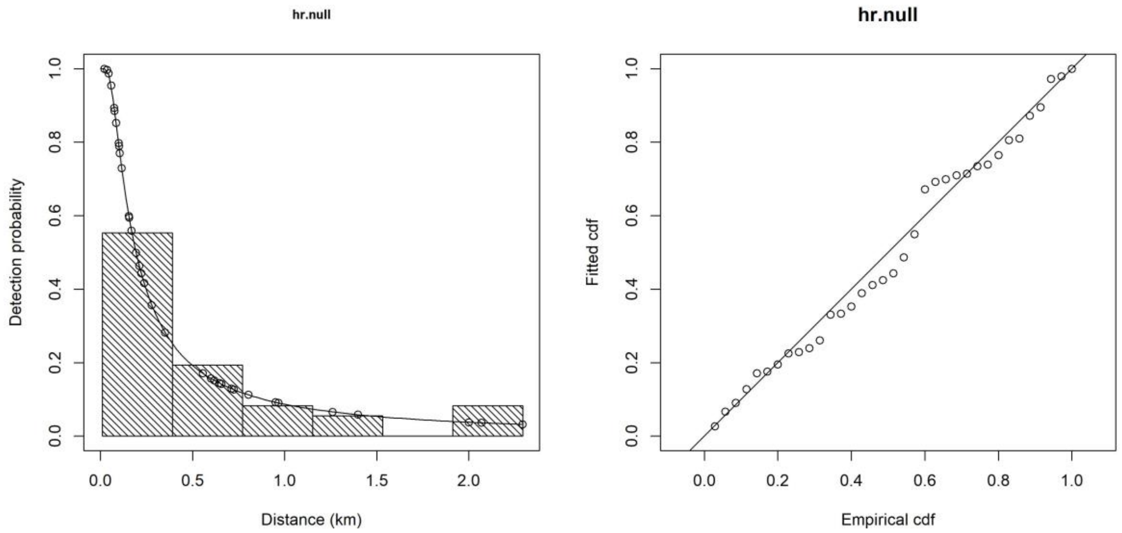


Figure C-200. Plot of the detection function (left) and QQ-Plot (right).

2.29.5. Bottlenose dolphin

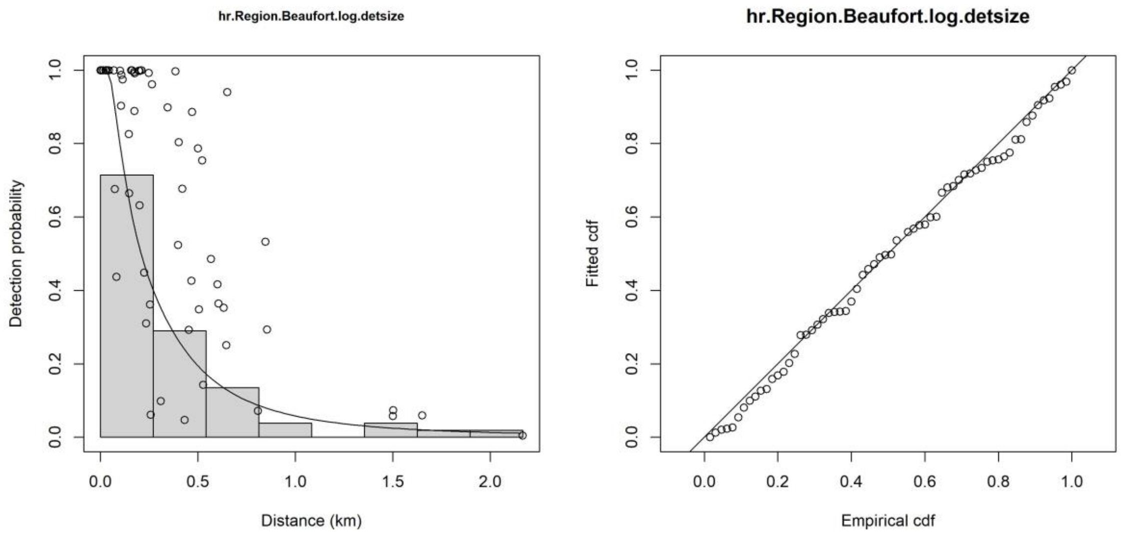


Figure C-201. Plot of the detection function (left) and QQ-Plot (right).

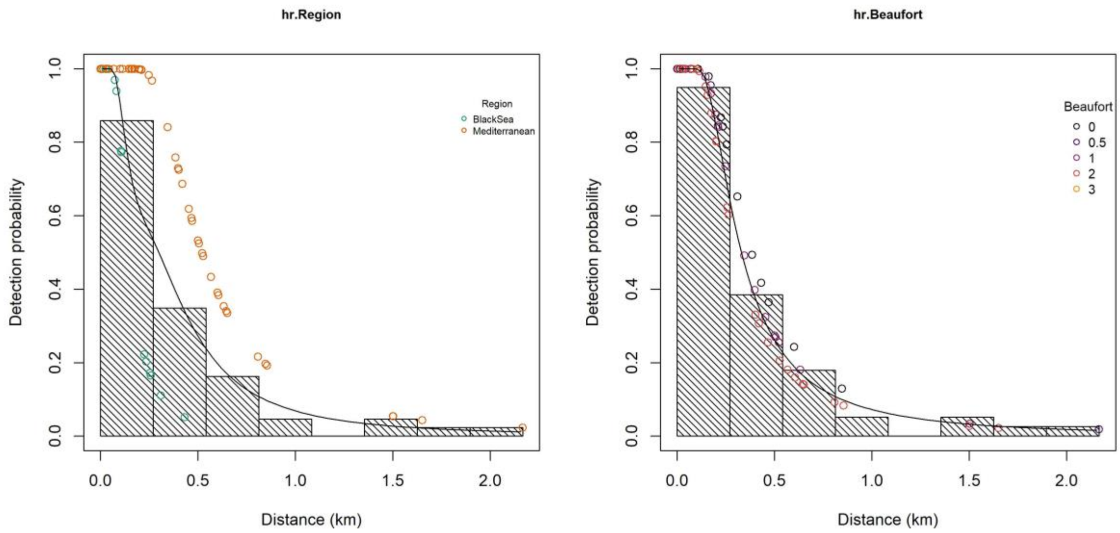


Figure C-202. Detection functions of the individual covariates.

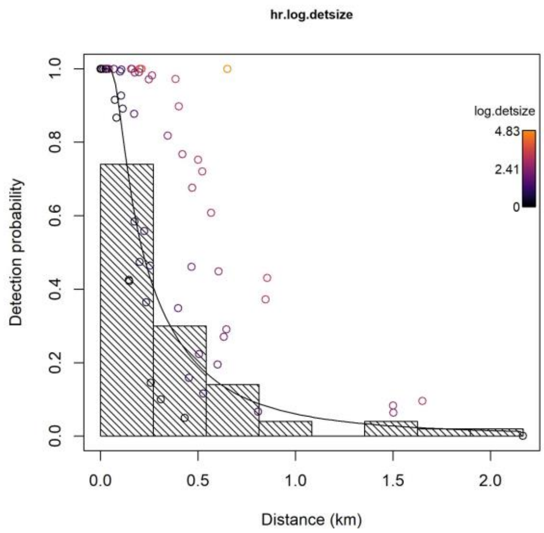


Figure C-203. Detection functions of the individual covariates.

2.30. Platform Group G2 - G4 - G7 - None

2.30.1. Long-finned pilot whale

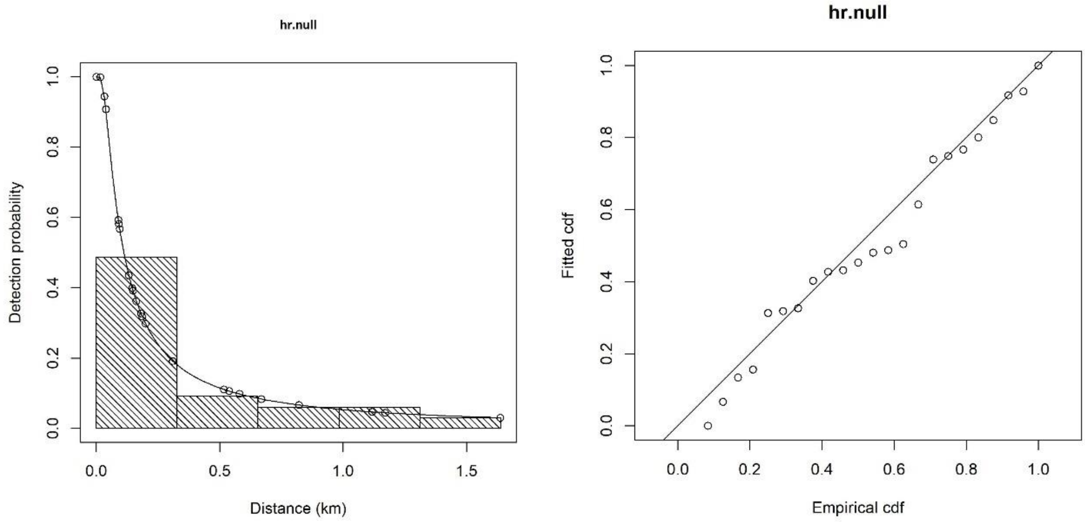


Figure C-204. Plot of the detection function (left) and QQ-Plot (right).

2.31. Platform Group G2 - None

2.31.1. Striped dolphin - Common dolphin - Unidentified dolphin

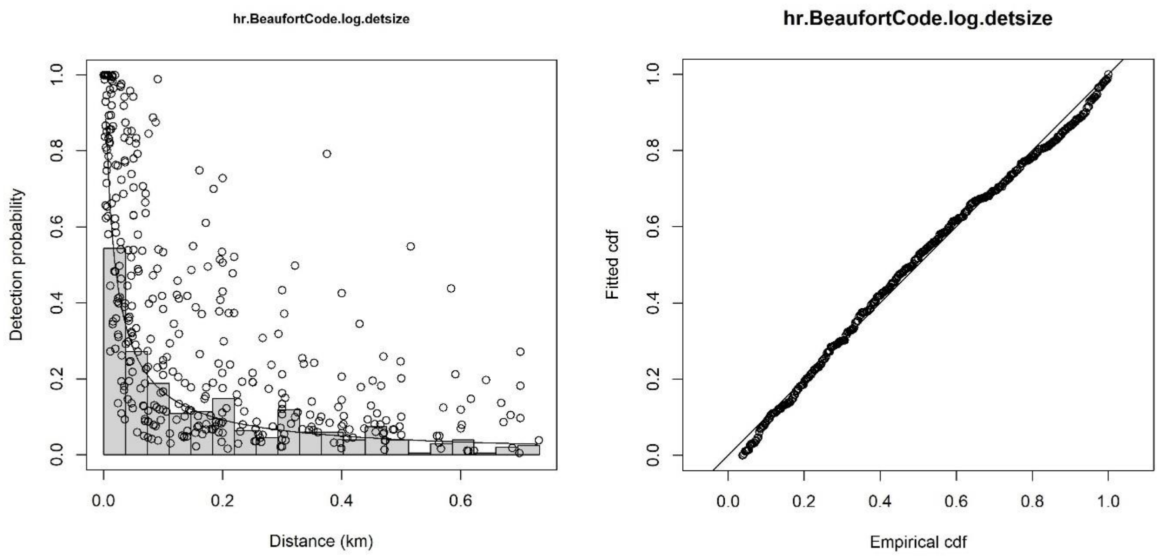


Figure C-205. Plot of the detection function (left) and QQ-Plot (right).

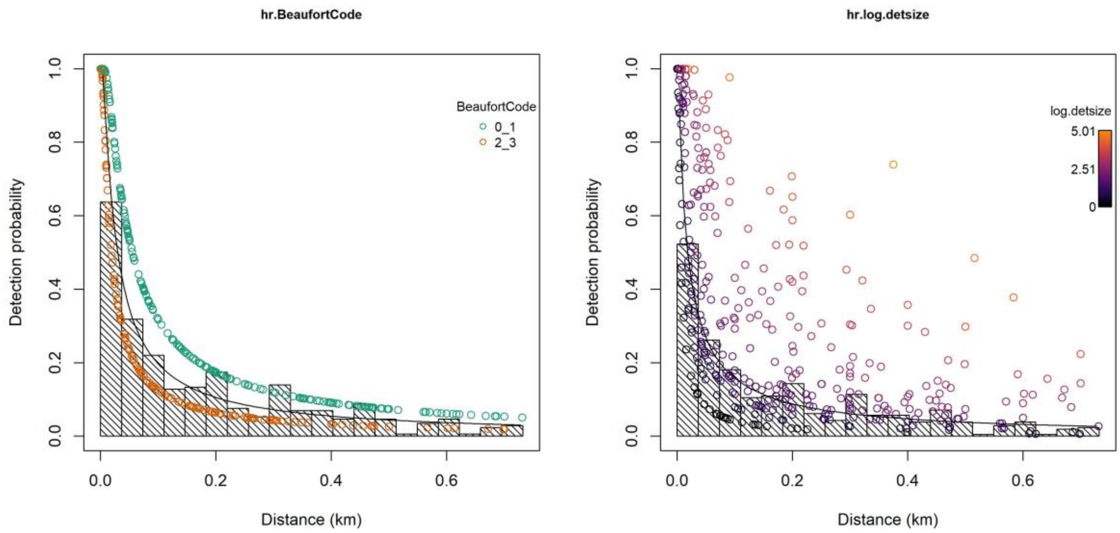


Figure C-206. Detection functions of the individual covariates.

2.31.2. Bottlenose dolphin

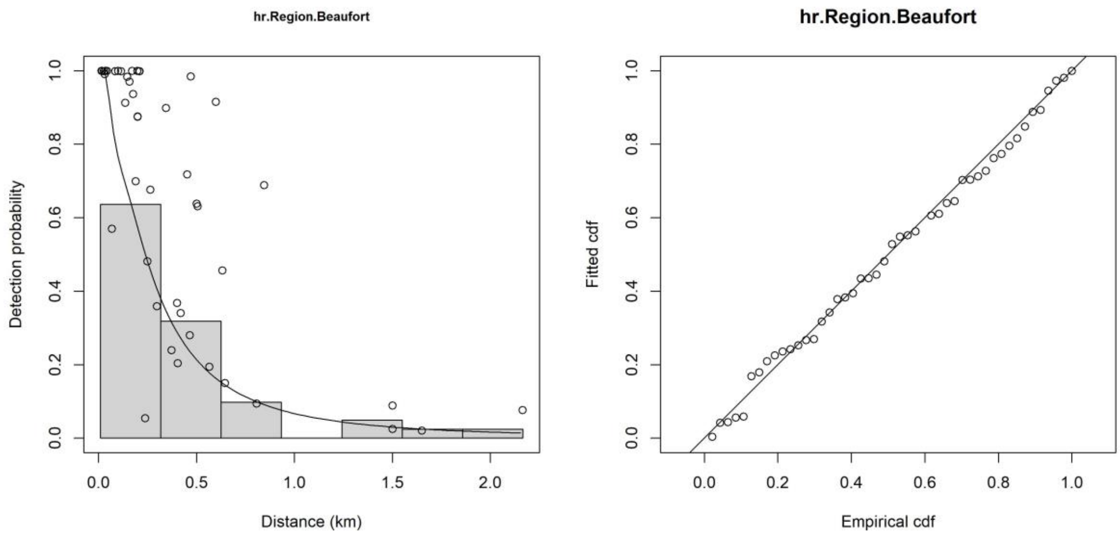


Figure C-207. Plot of the detection function (left) and QQ-Plot (right).

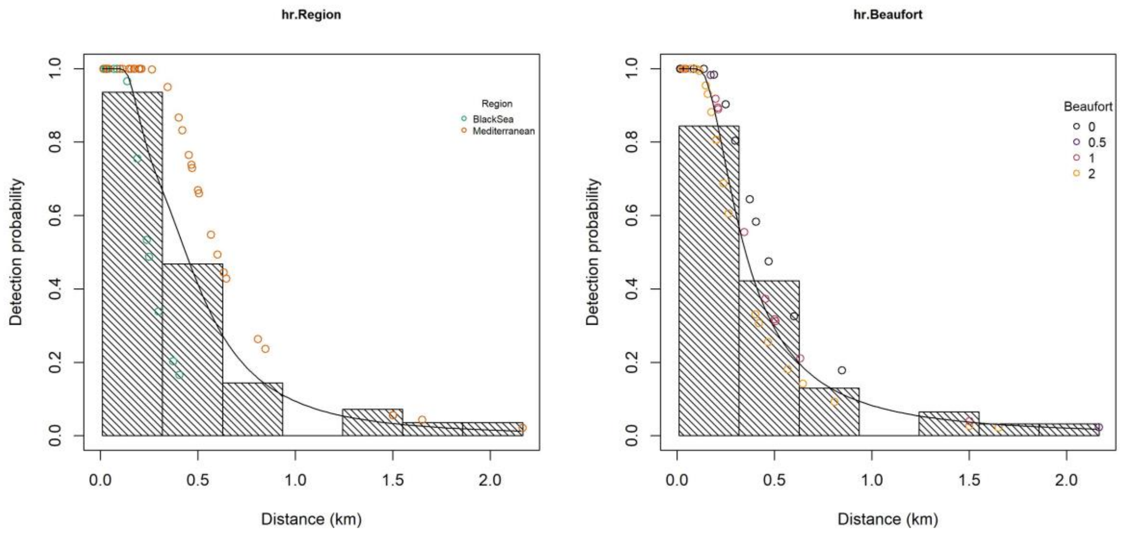


Figure C-208. Detection functions of the individual covariates.

2.31.3. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

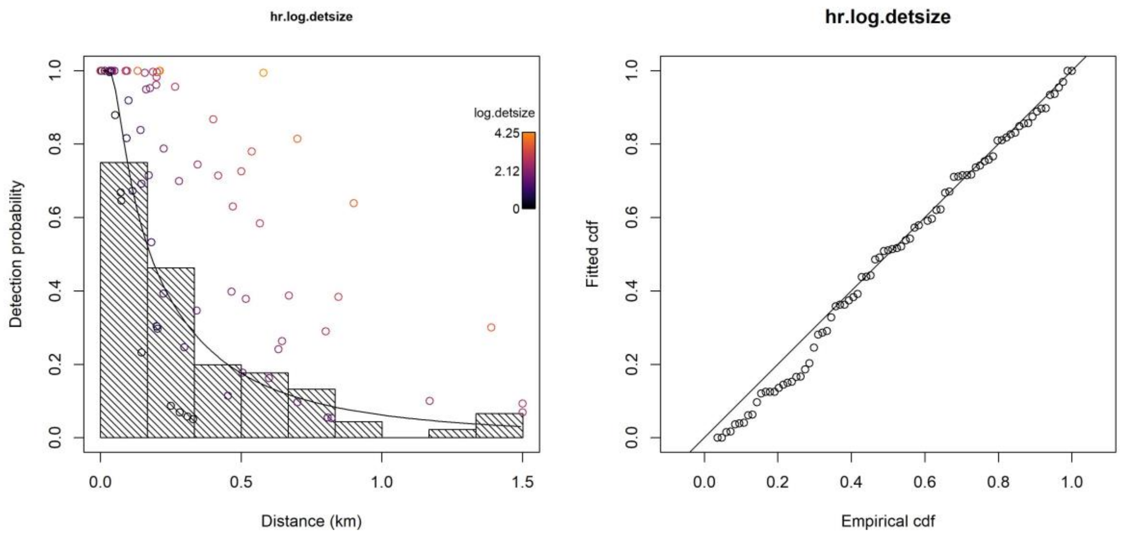


Figure C-209. Plot of the detection function (left) and QQ-Plot (right).

2.31.4. Cuvier's beaked whale

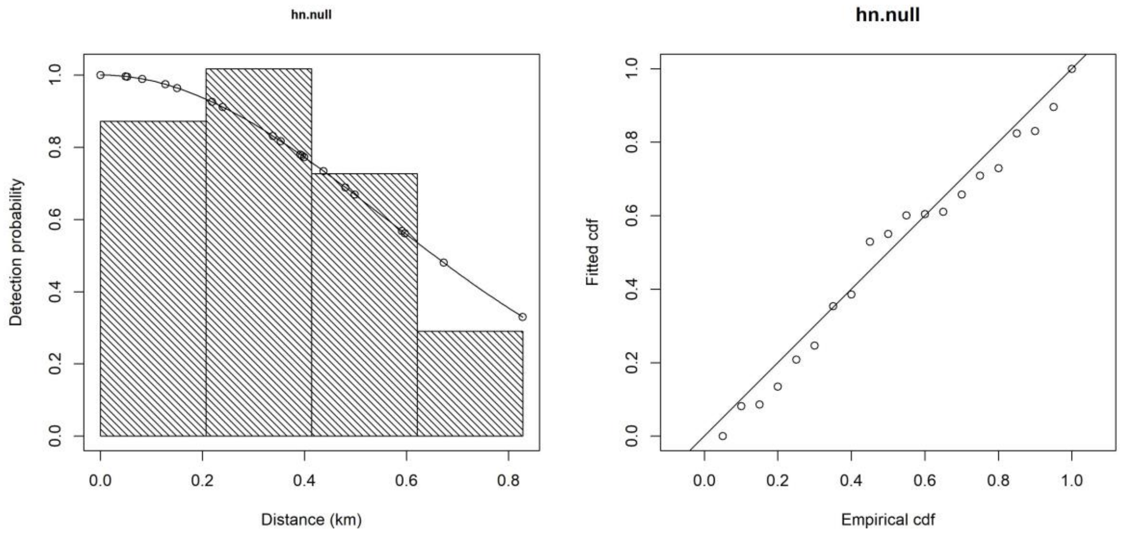


Figure C-210. Plot of the detection function (left) and QQ-Plot (right).

2.32. Platform Group G2 - None - BDRI

2.32.1. Bottlenose dolphin

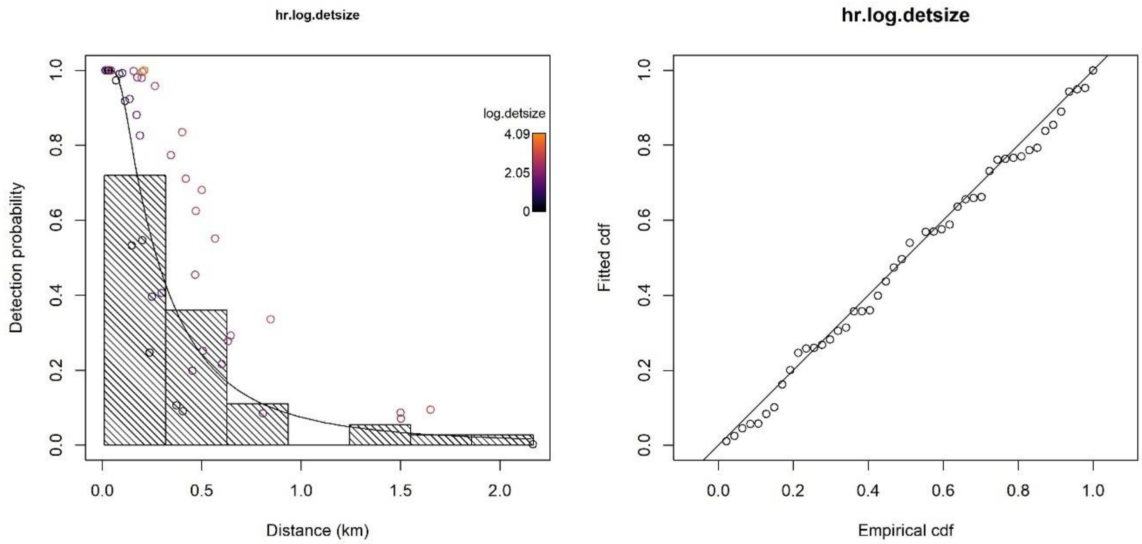


Figure C-211. Plot of the detection function (left) and QQ-Plot (right).

2.33. Platform Group G3 - G10 - G11 - None

2.33.1. Cuvier's beaked whale

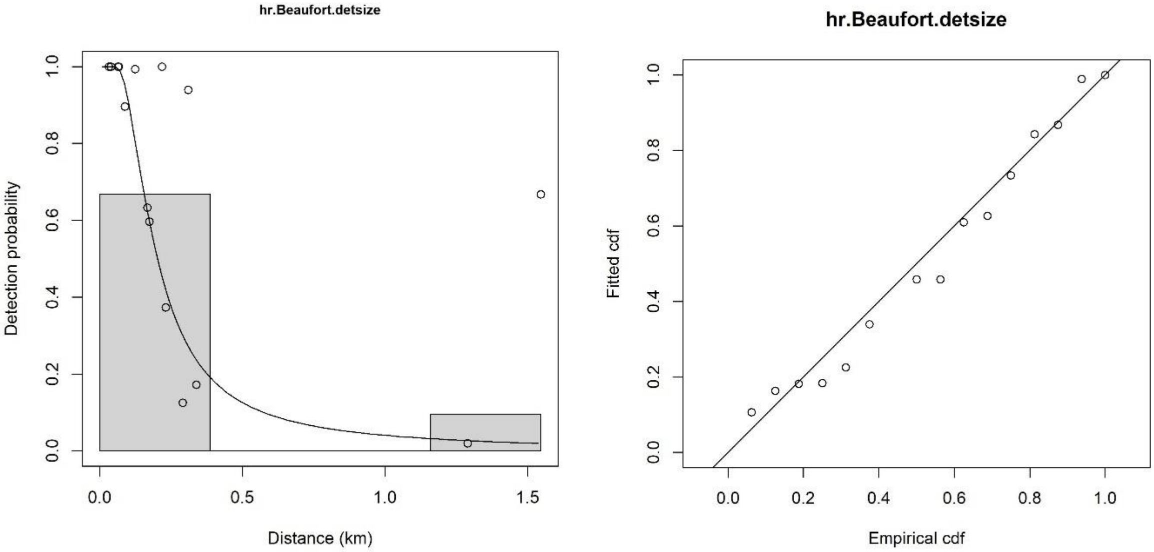


Figure C-212. Plot of the detection function (left) and QQ-Plot (right).

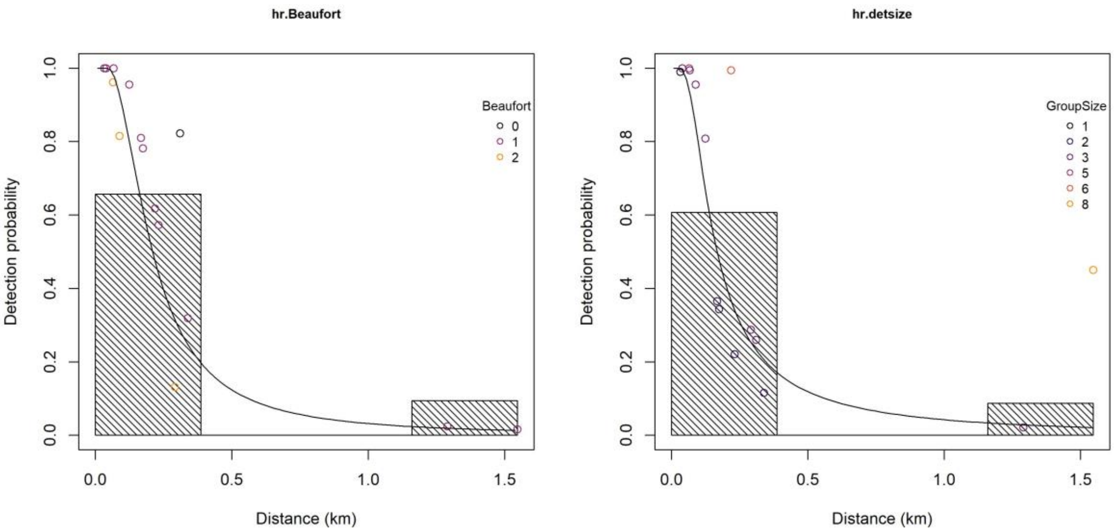


Figure C-213. Detection functions of the individual covariates.

2.34. Platform Group G3 - G10 - None

2.34.1. Bottlenose dolphin

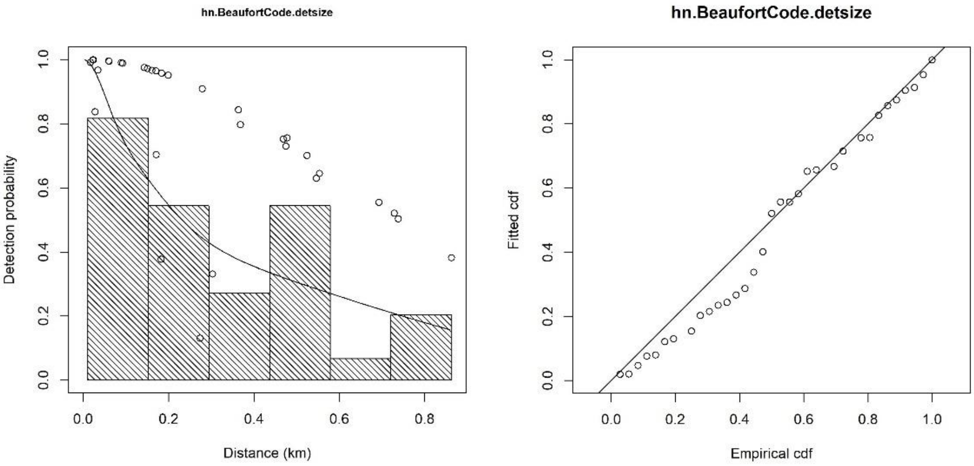


Figure C-214. Plot of the detection function (left) and QQ-Plot (right).

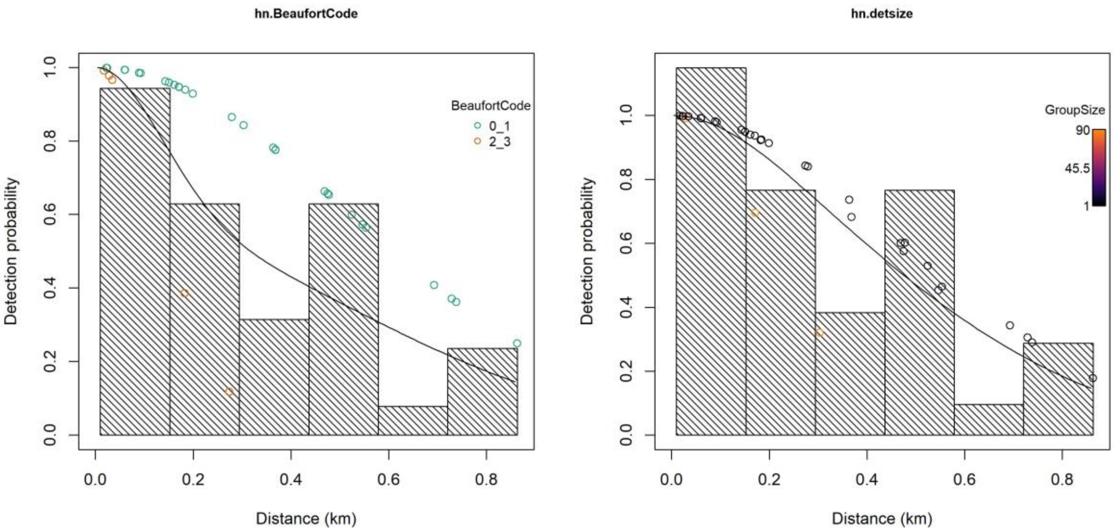


Figure C-215. Detection functions of the individual covariates.

2.34.2. Bottlenose dolphin - Risso's dolphin

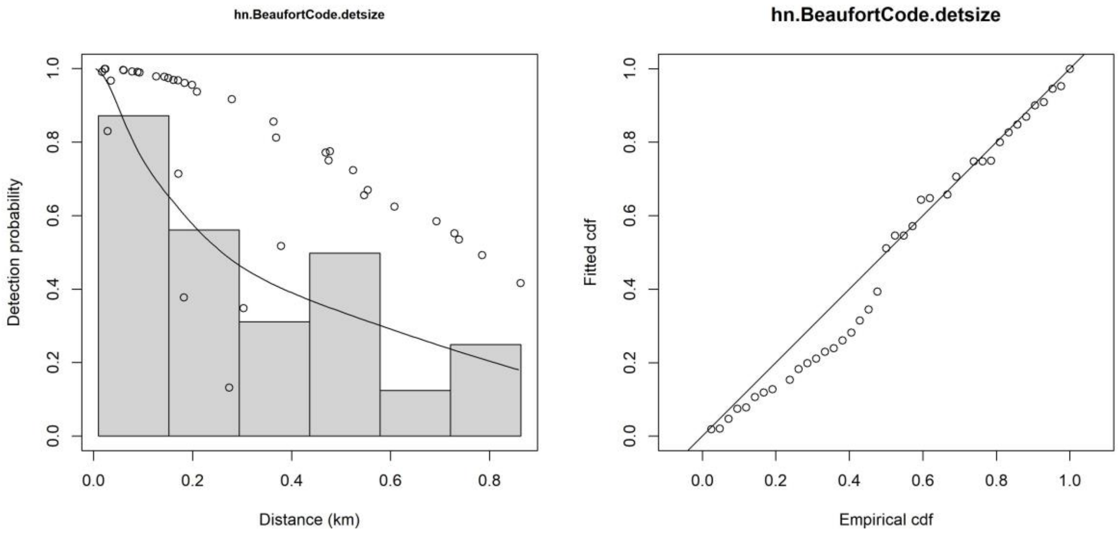


Figure C-216. Plot of the detection function (left) and QQ-Plot (right).

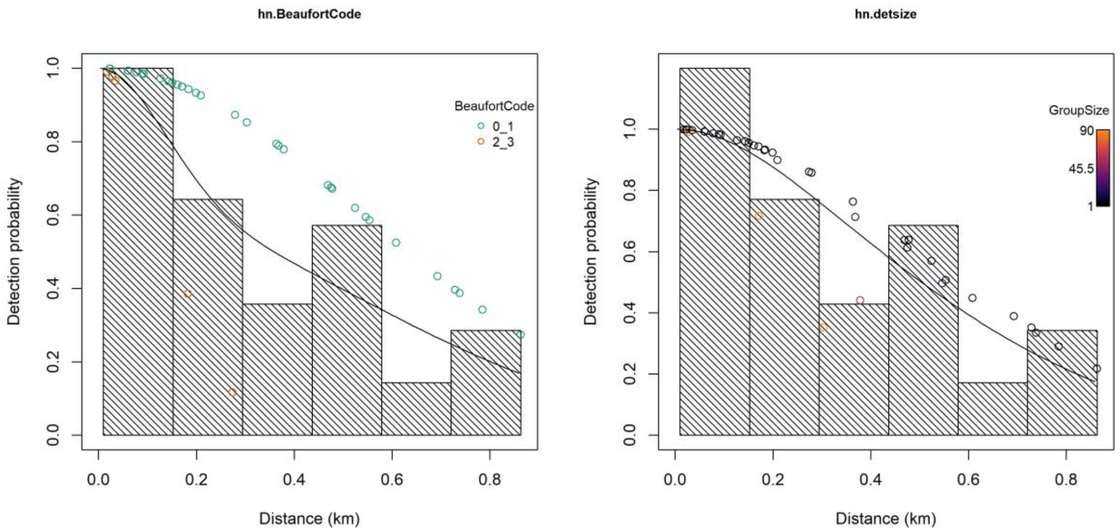


Figure C-217. Detection functions of the individual covariates.

2.34.3. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

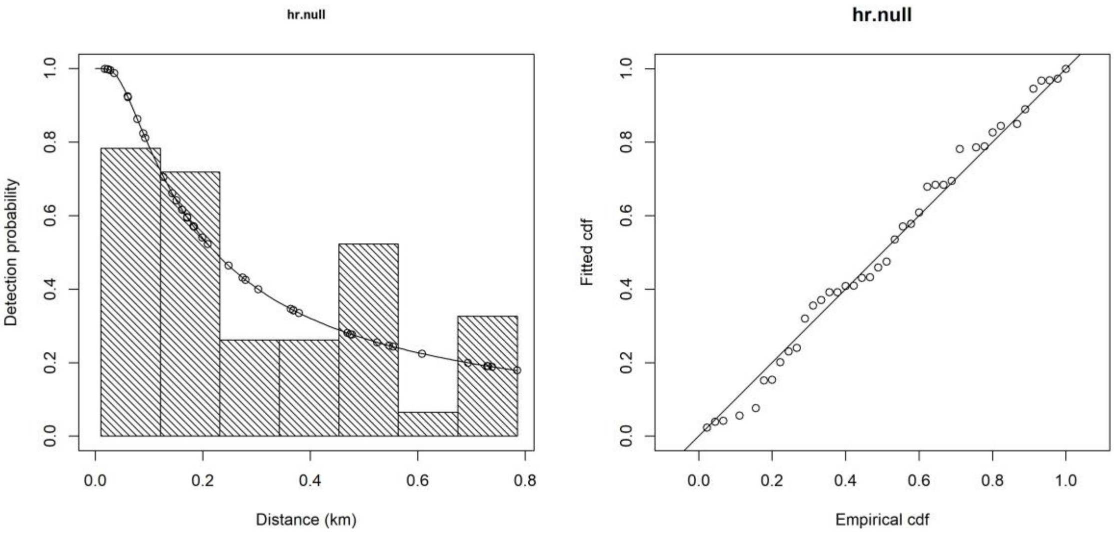


Figure C-218. Plot of the detection function (left) and QQ-Plot (right).

2.35. Platform Group G3 - None

2.35.1. Striped dolphin - Common dolphin

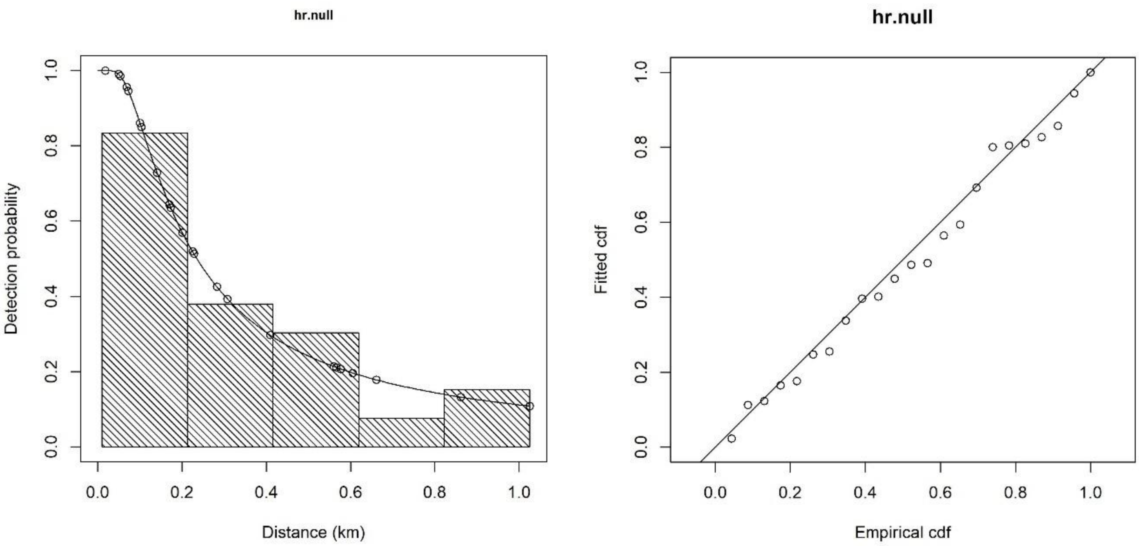


Figure C-219. Plot of the detection function (left) and QQ-Plot (right).

2.35.2. Striped dolphin - Common dolphin - Unidentified dolphin

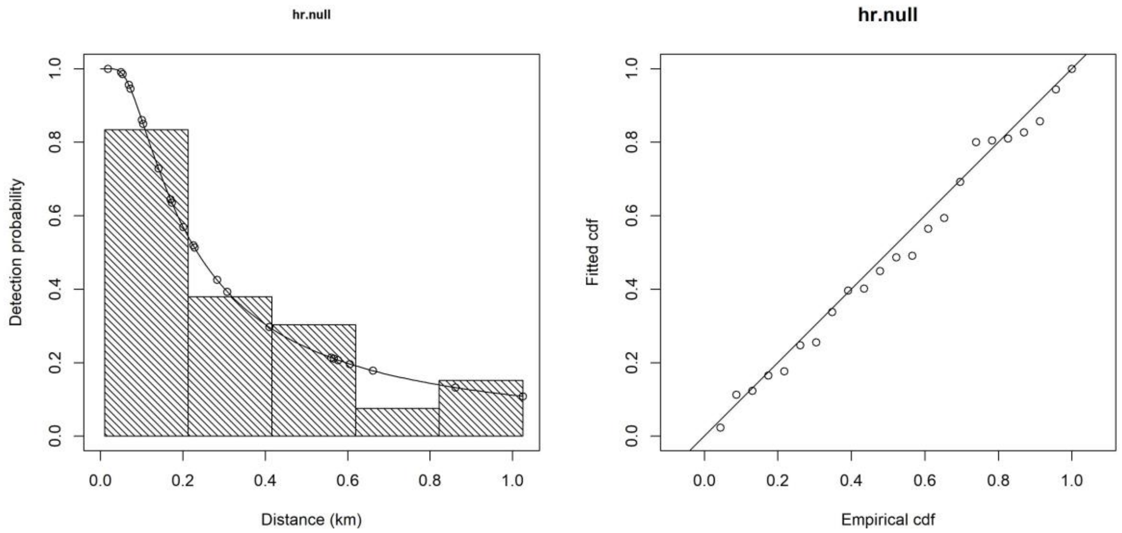


Figure C-220. Plot of the detection function (left) and QQ-Plot (right).

2.36. Platform Group G4 - 3_5

2.36.1. Fin whale - Sperm whale – Unidentified whale

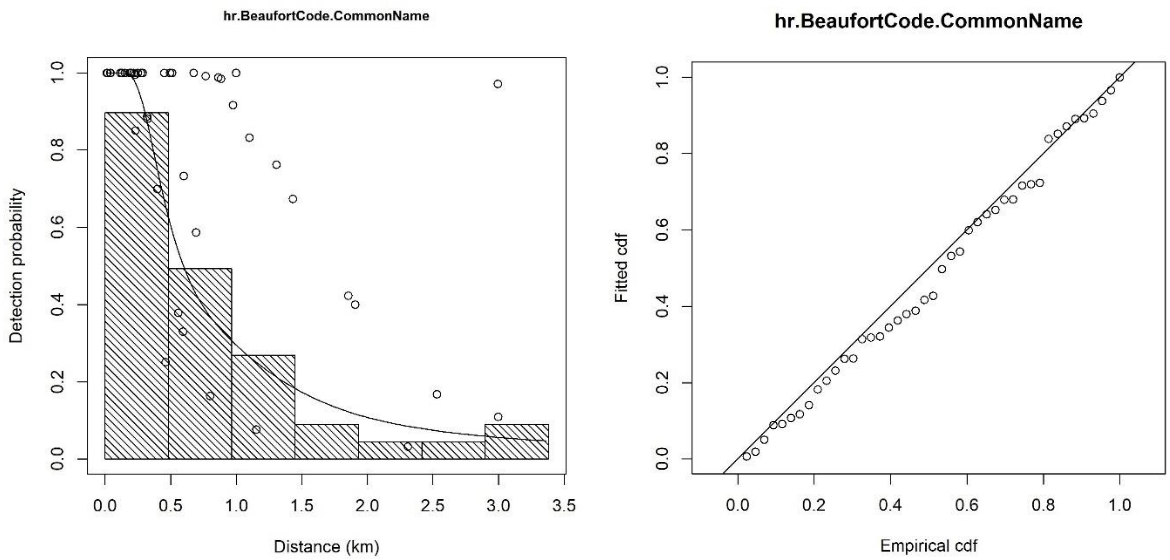


Figure C-221. Plot of the detection function (left) and QQ-Plot (right).

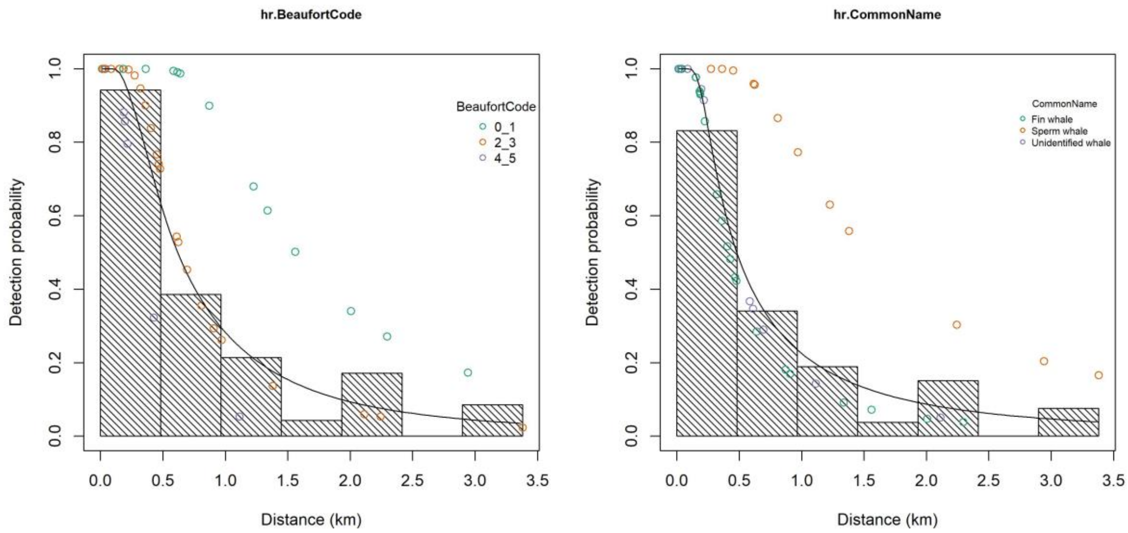


Figure C-222. Detection functions of the individual covariates.

2.36.2. Striped dolphin

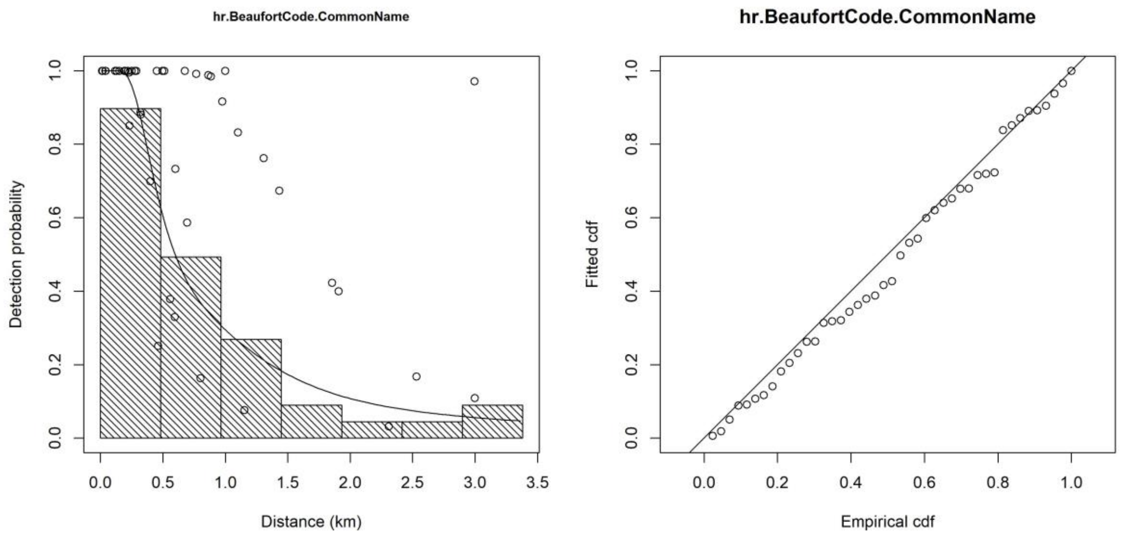


Figure C-223. Plot of the detection function (left) and QQ-Plot (right).

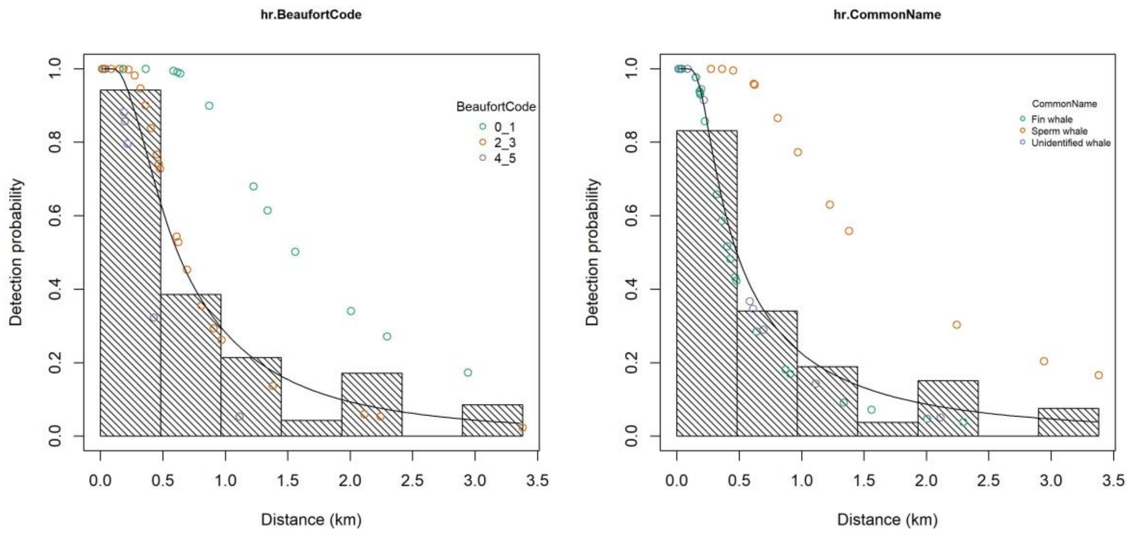


Figure C-224. Detection functions of the individual covariates.

2.36.3. Striped dolphin - Common dolphin

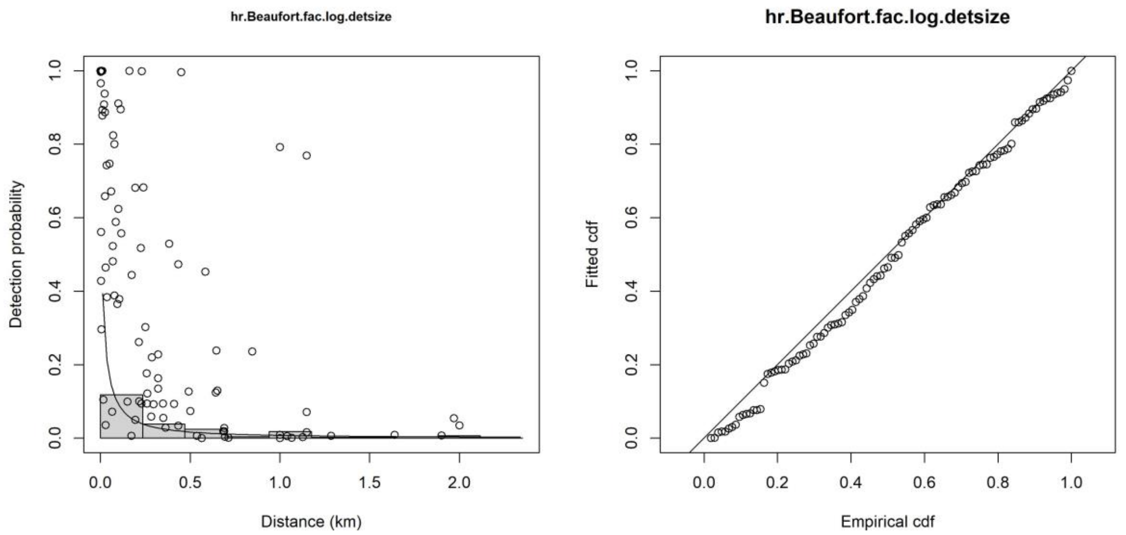


Figure C-225. Plot of the detection function (left) and QQ-Plot (right).

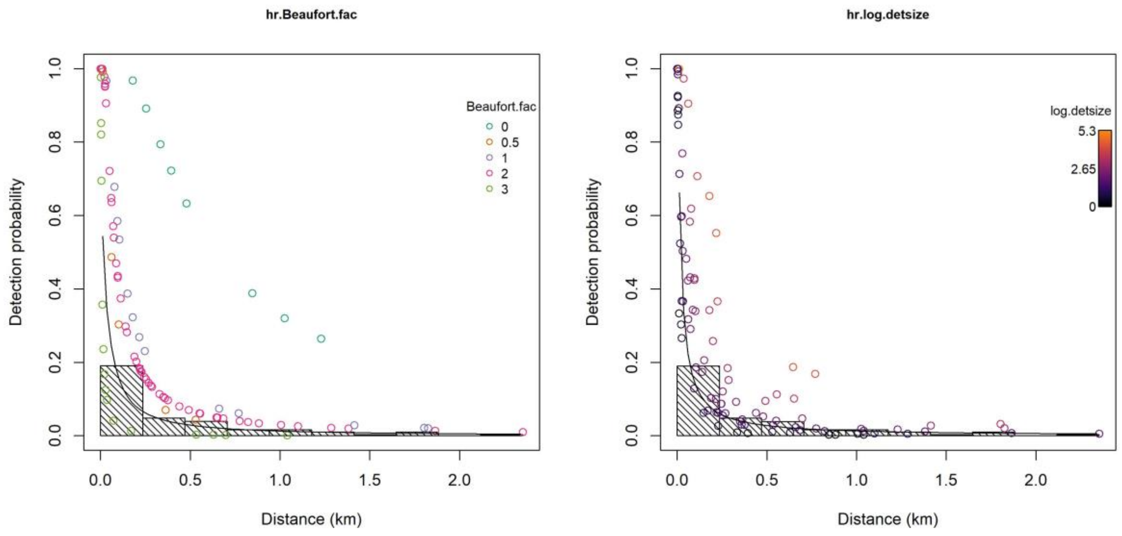


Figure C-226. Detection functions of the individual covariates.

2.36.4. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - Rough - toothed dolphin - False killer whale

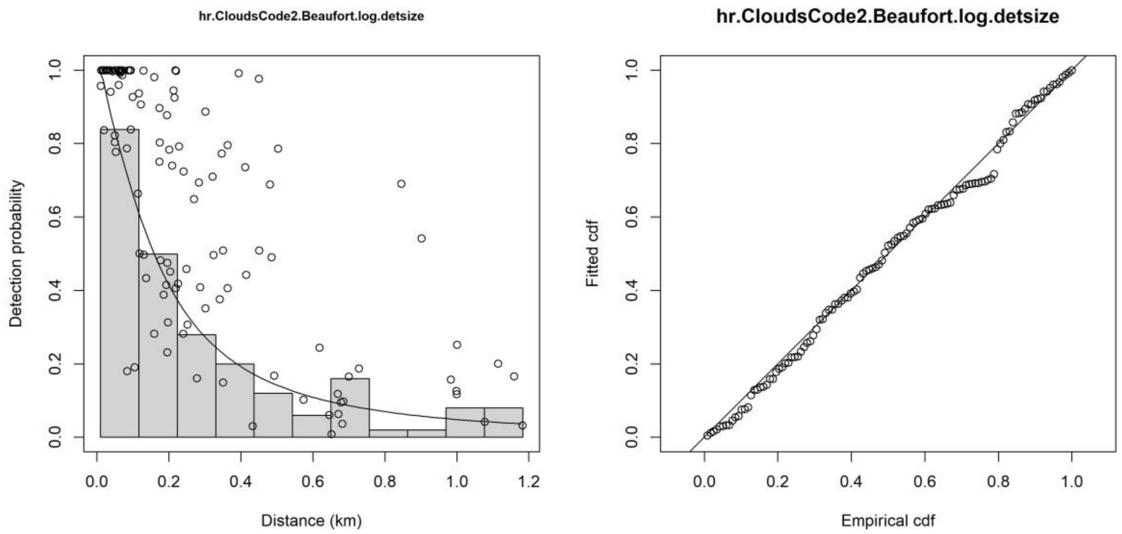
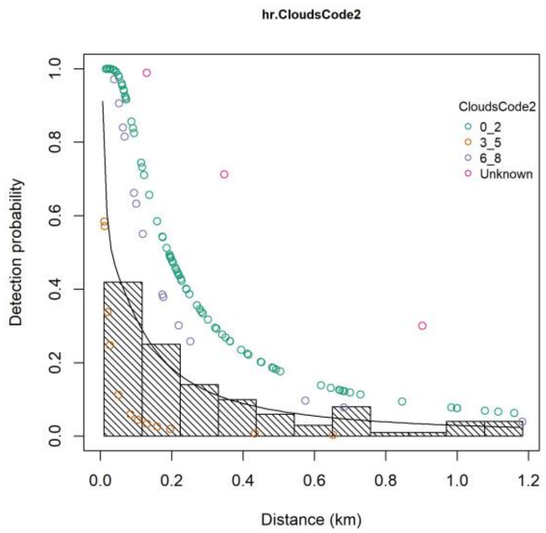


Figure C-227. Plot of the detection function (left) and QQ-Plot (right).



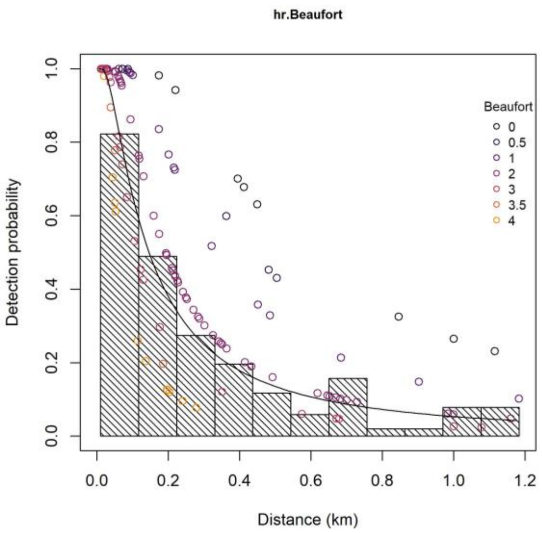


Figure C-229. Detection functions of the individual covariates.

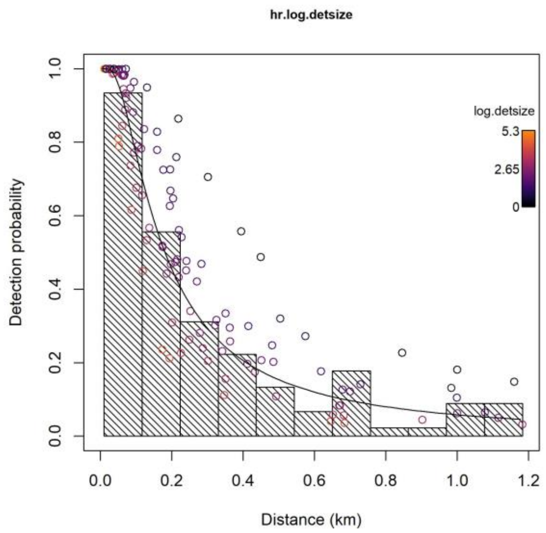


Figure C-229. Detection functions of the individual covariates.

2.36.5. Unidentified dolphin

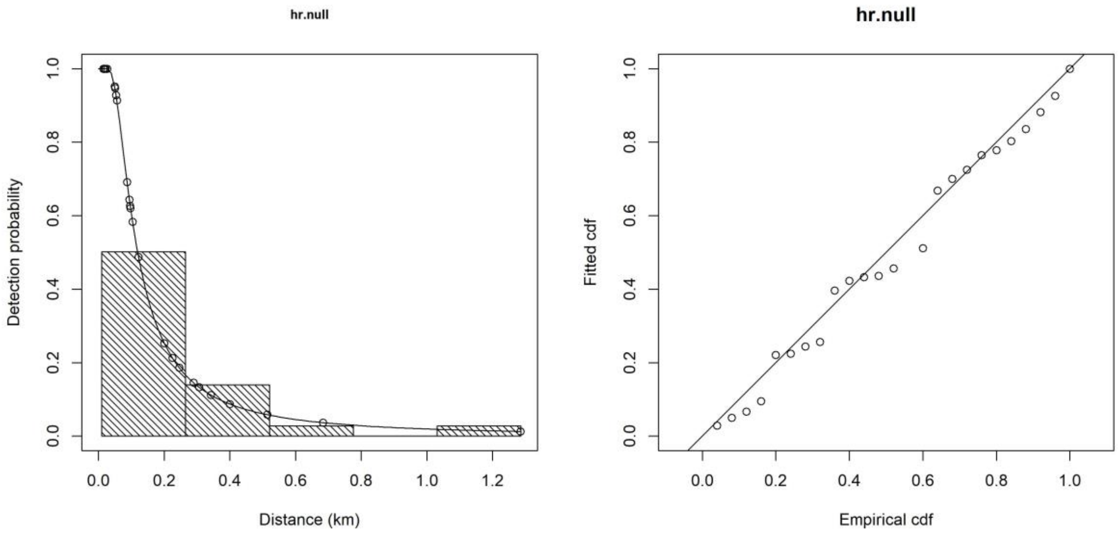


Figure C-230. Plot of the detection function (left) and QQ-Plot (right).

2.37. Platform Group G4 - 6_8

2.37.1. Fin whale

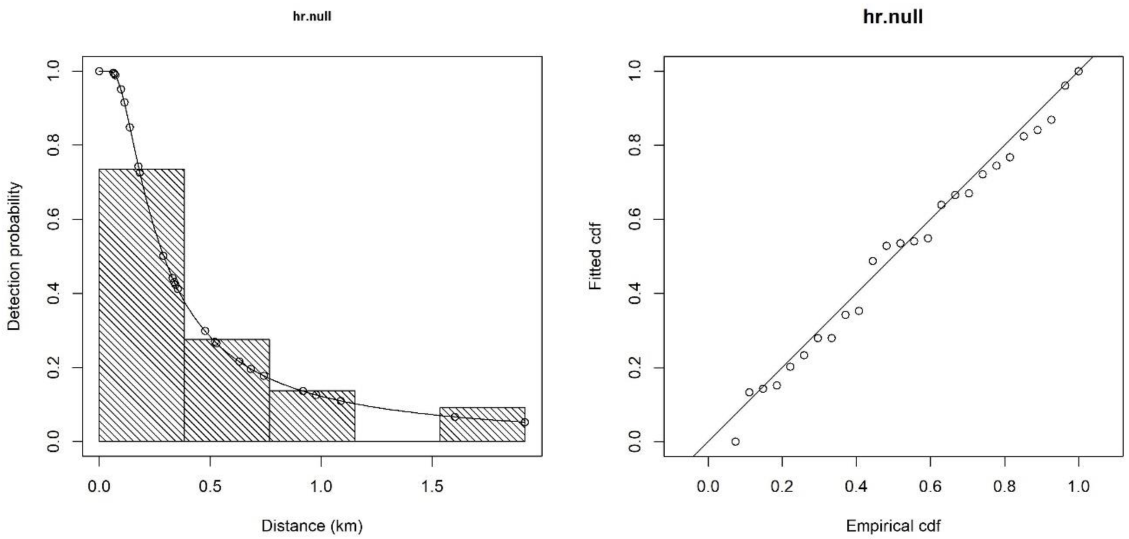


Figure C-231. Plot of the detection function (left) and QQ-Plot (right).

2.37.2. Fin whale - Unidentified Balaenoptera

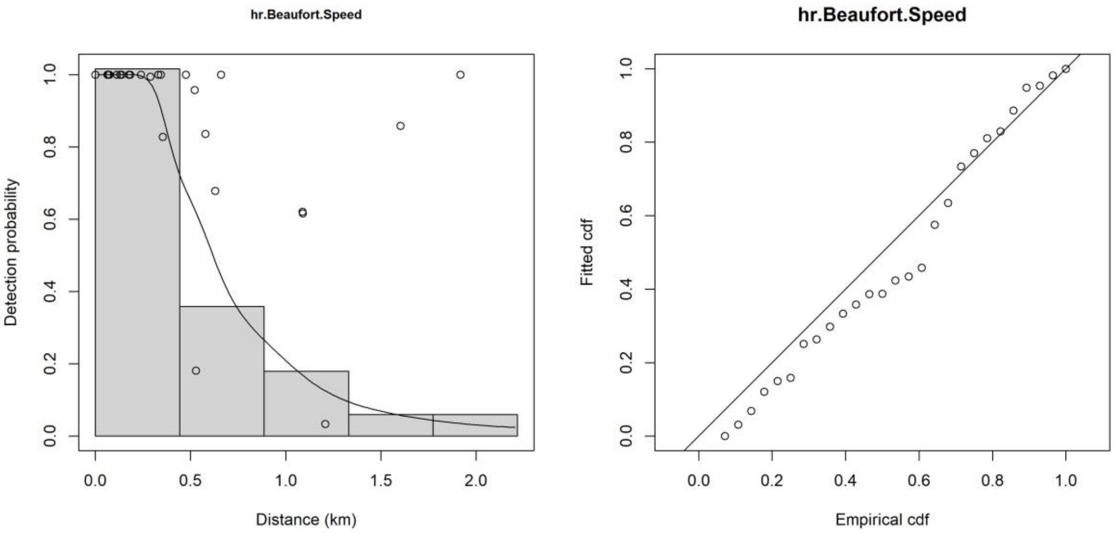


Figure C-232. Plot of the detection function (left) and QQ-Plot (right).

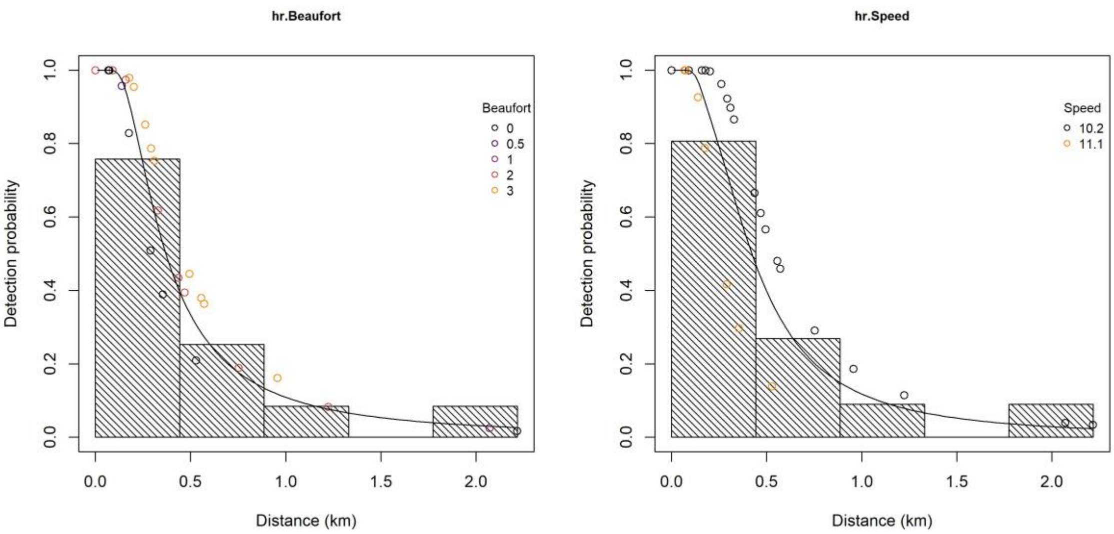


Figure C-233. Detection functions of the individual covariates.

2.37.3. Fin whale - Unidentified Balaenoptera - Sperm whale

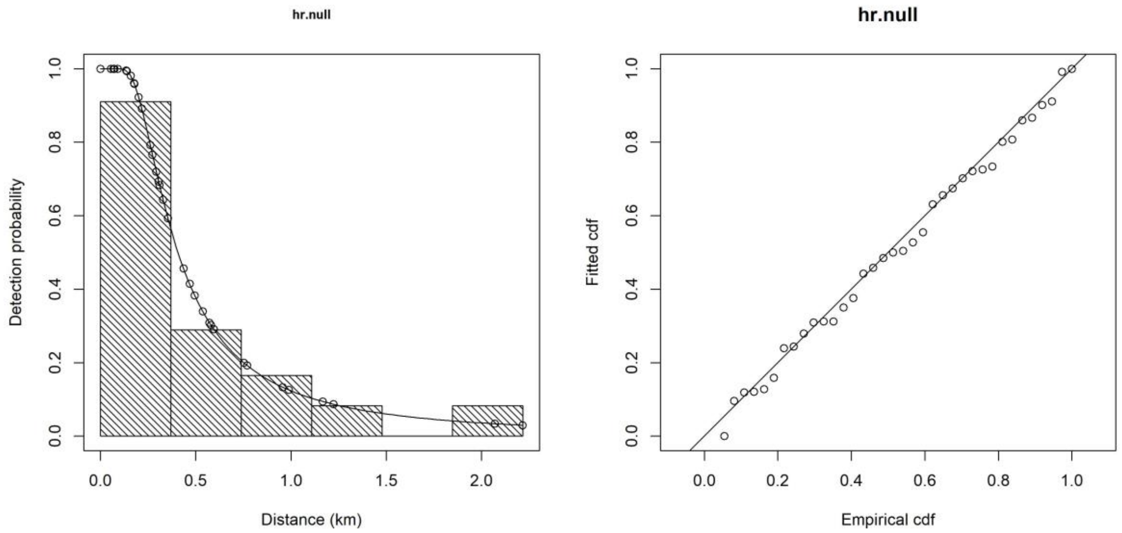


Figure C-234. Plot of the detection function (left) and QQ-Plot (right).

2.37.4. Striped dolphin

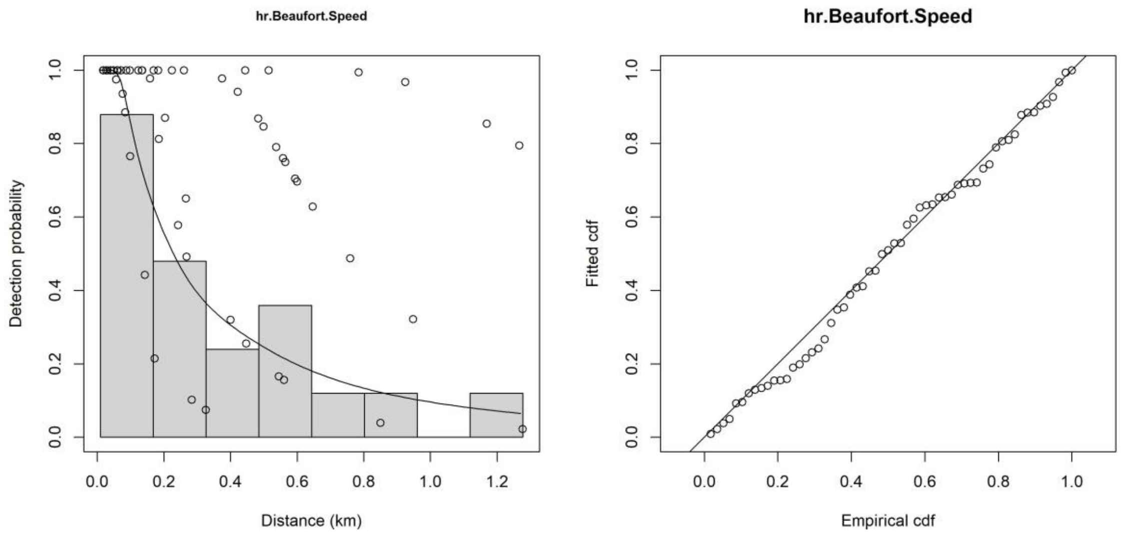


Figure C-235. Plot of the detection function (left) and QQ-Plot (right).

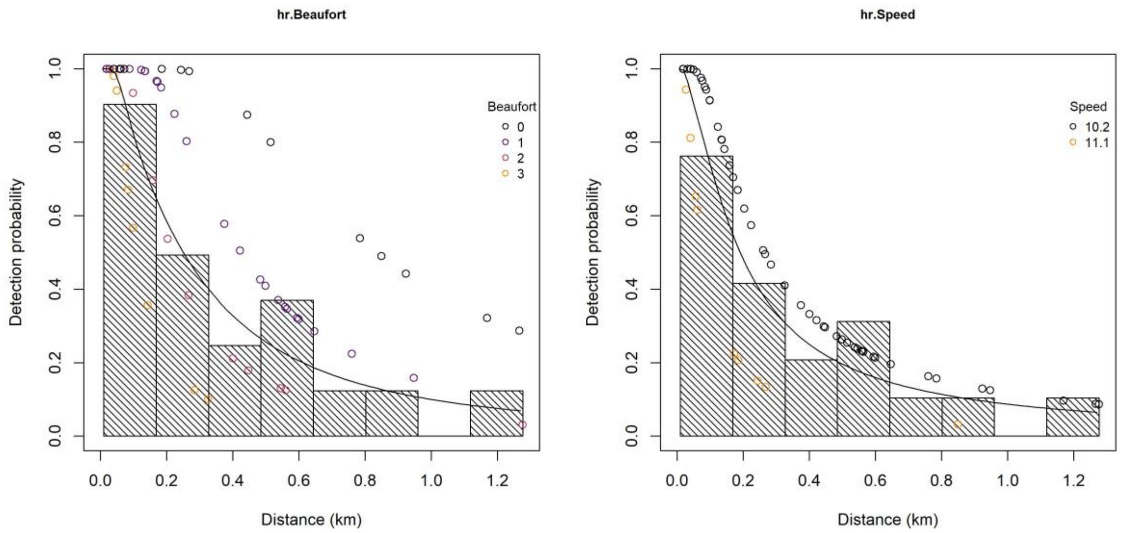


Figure C-236. Detection functions of the individual covariates.

2.37.5. Striped dolphin - Common dolphin

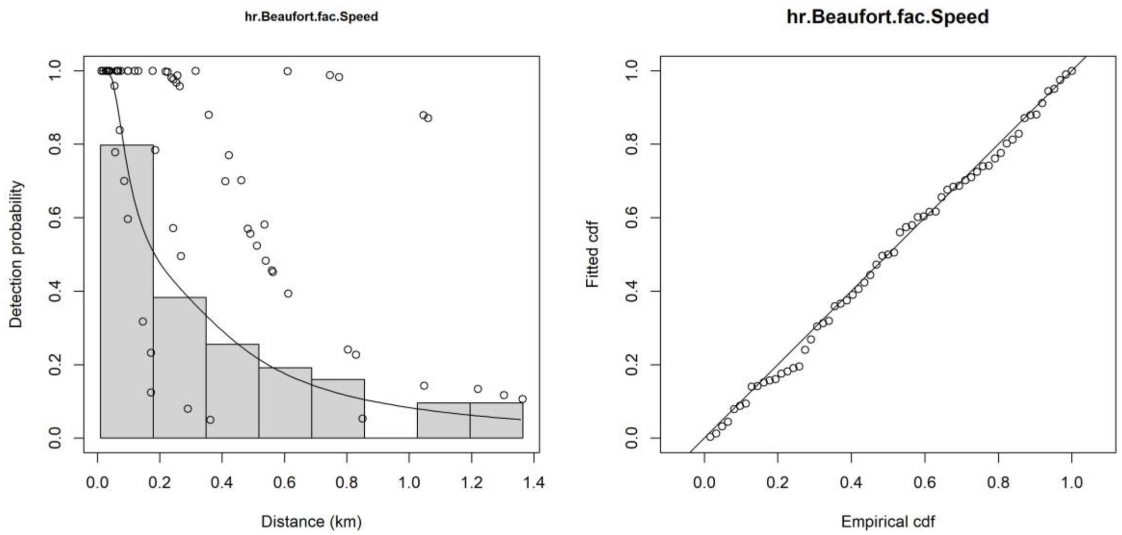


Figure C-237. Plot of the detection function (left) and QQ-Plot (right).

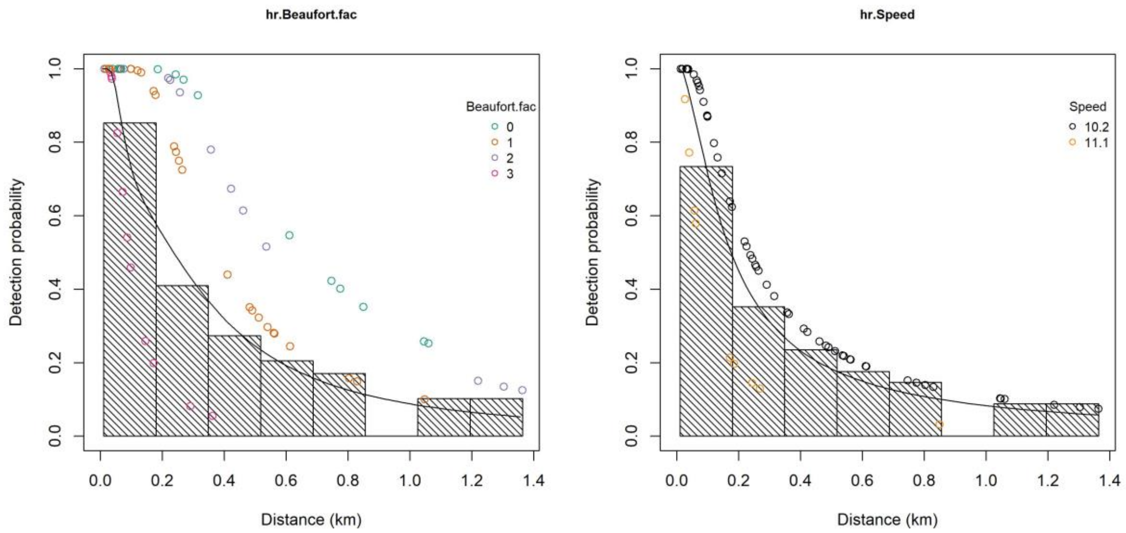


Figure C-238. Detection functions of the individual covariates.

2.37.6. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - Unidentified dolphin

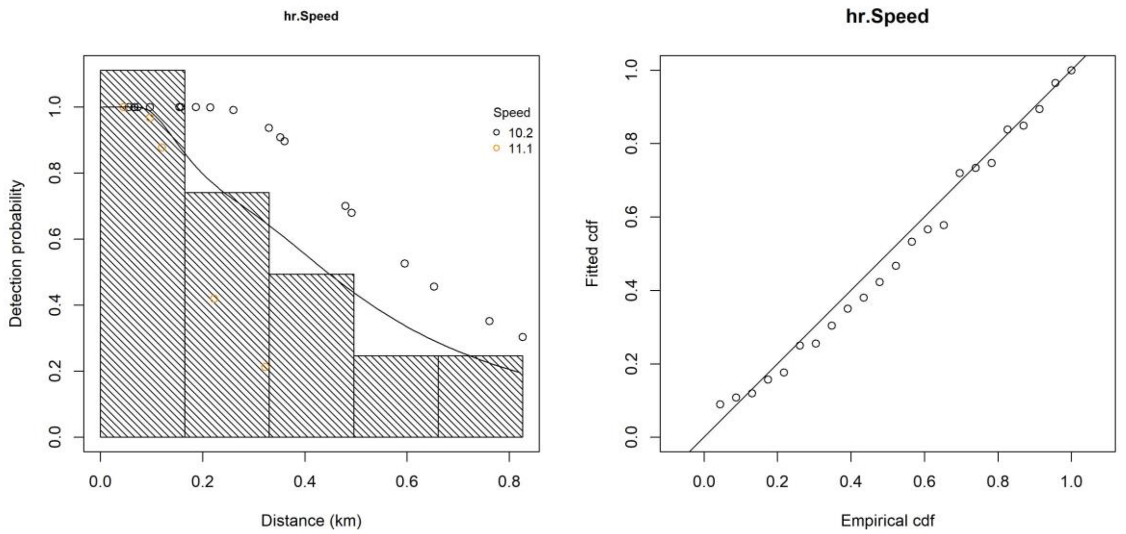


Figure C-239. Plot of the detection function (left) and QQ-Plot (right).

2.38. Platform Group G4 - All

2.38.1. Fin whale

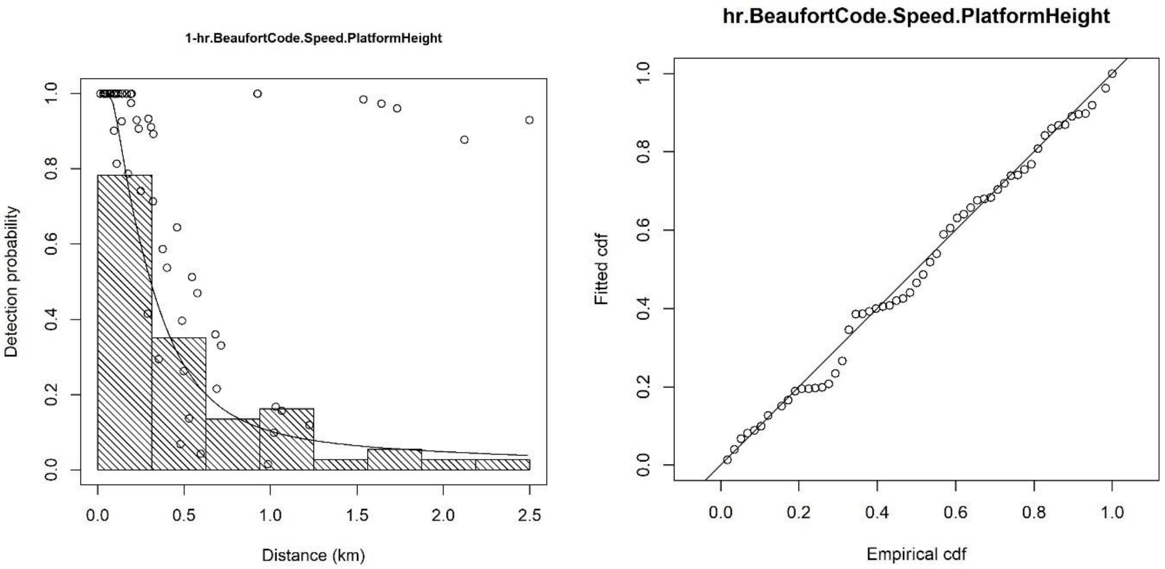


Figure C-240. Plot of the detection function (left) and QQ-Plot (right).

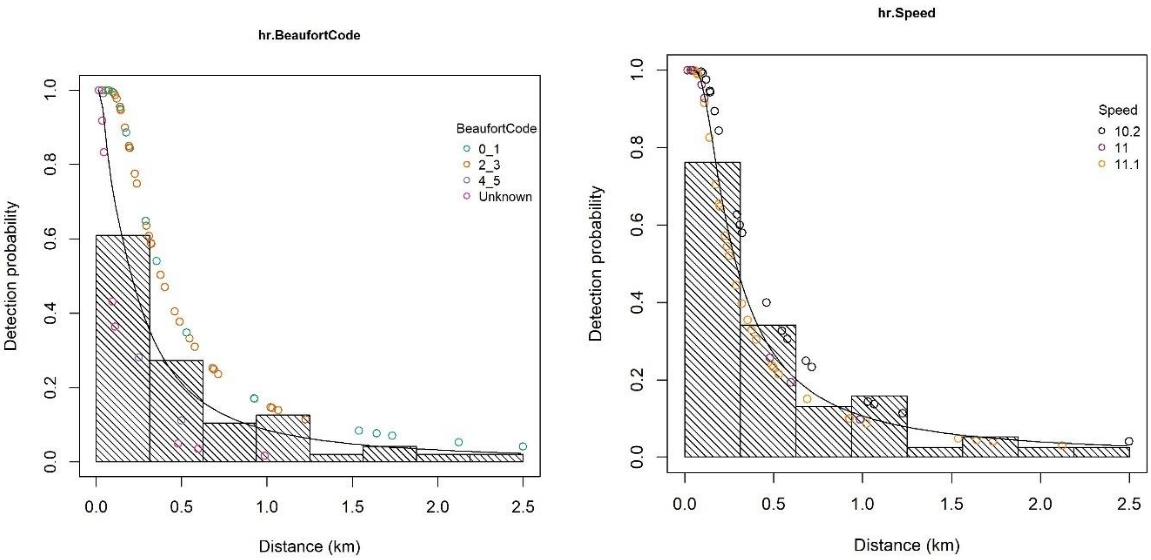


Figure C-241. Detection functions of the individual covariates.

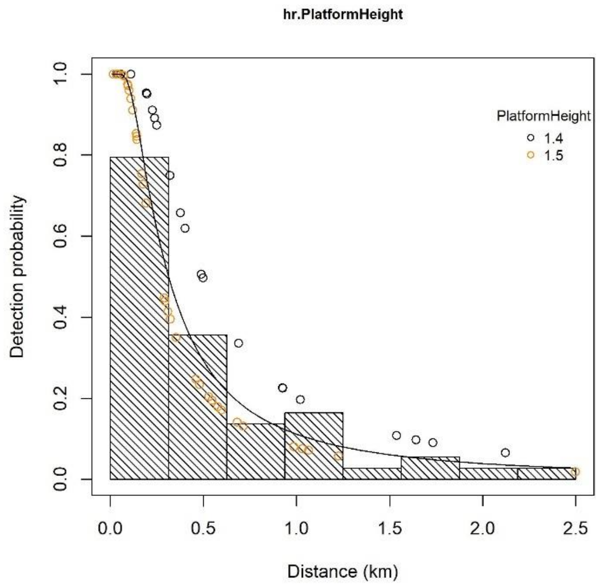


Figure C-242. Detection functions of the individual covariates.

2.38.2. Fin whale - Unidentified Balaenoptera - Sperm whale - Unidentified whale

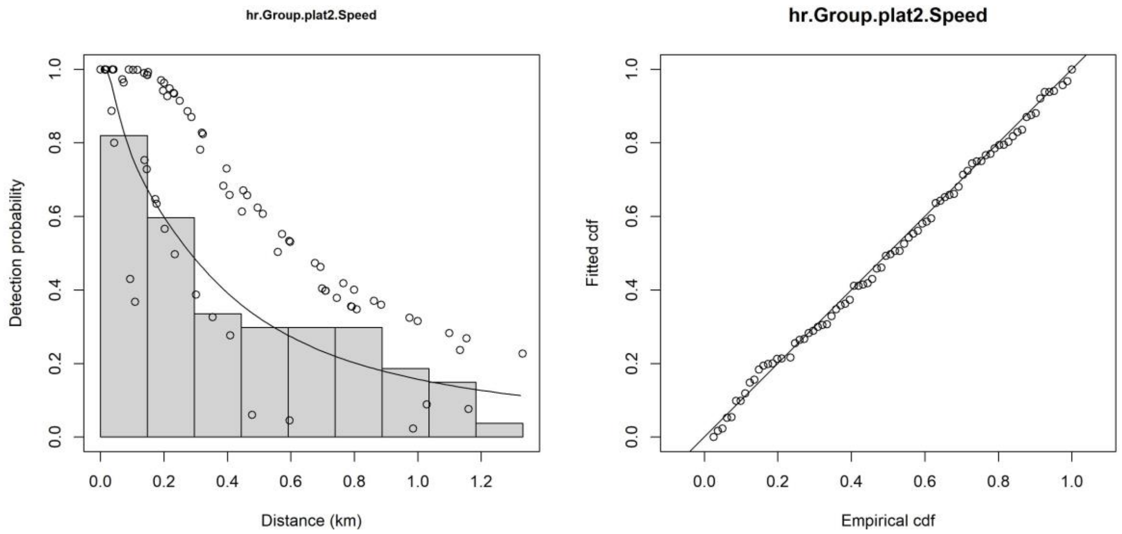


Figure C-243. Plot of the detection function (left) and QQ-Plot (right).

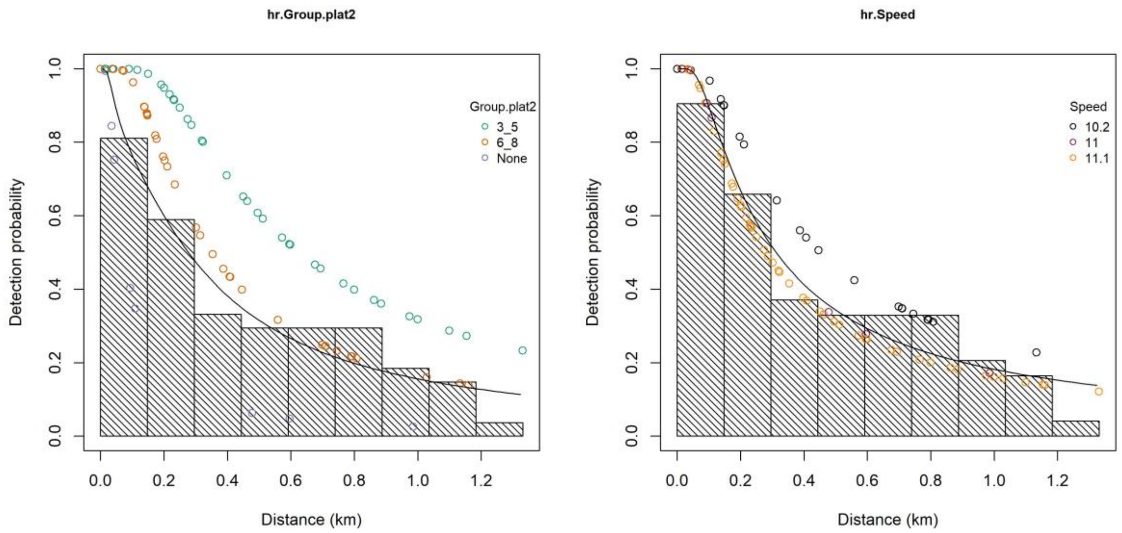


Figure C-244. Detection functions of the individual covariates.

2.38.3. Risso's dolphin

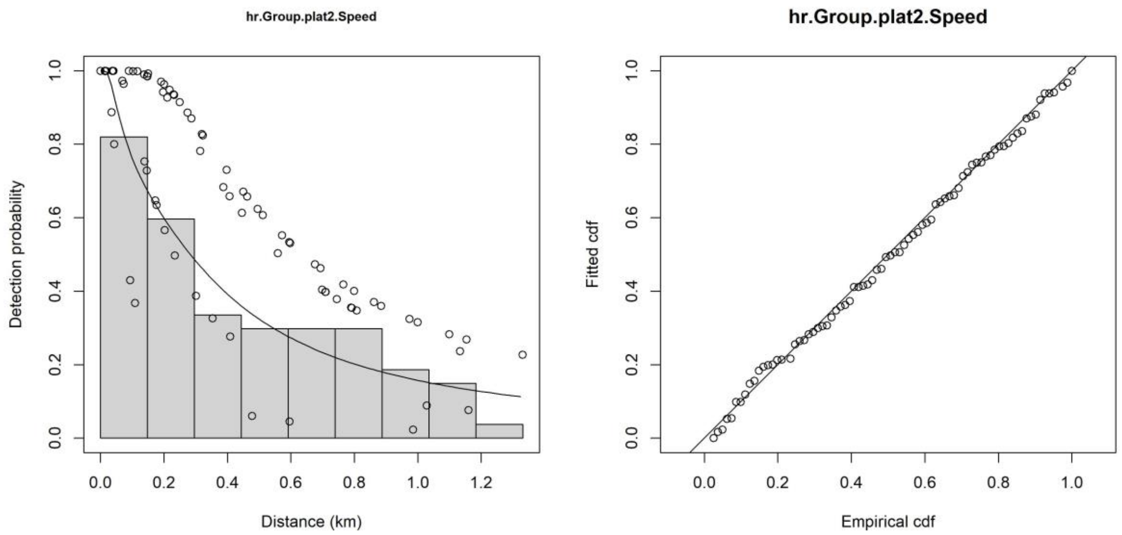


Figure C-245. Plot of the detection function (left) and QQ-Plot (right).

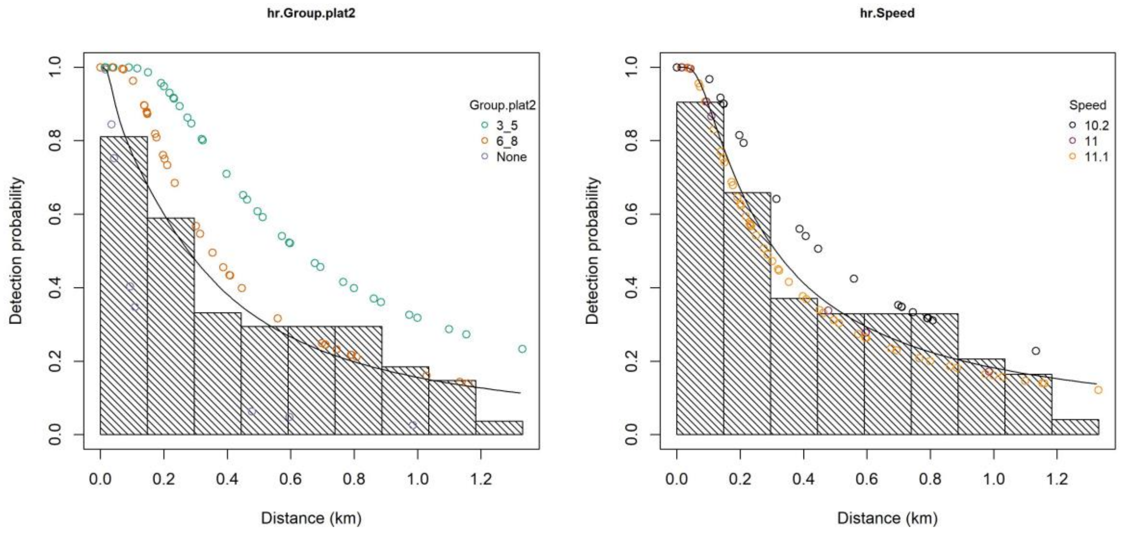


Figure C-246. Detection functions of the individual covariates.

2.39. Platform Group G4 - G6 - G7 - All

2.39.1. Fin whale

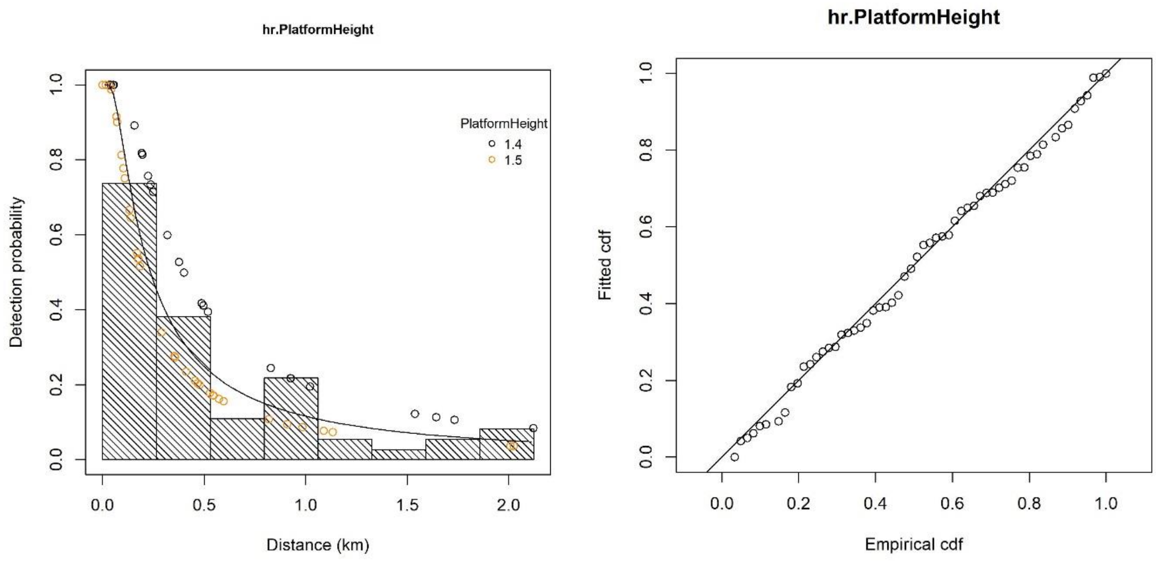


Figure C-247. Plot of the detection function (left) and QQ-Plot (right).

2.40. Platform Group G4 - G7 - All

2.40.1. Unidentified beaked whale

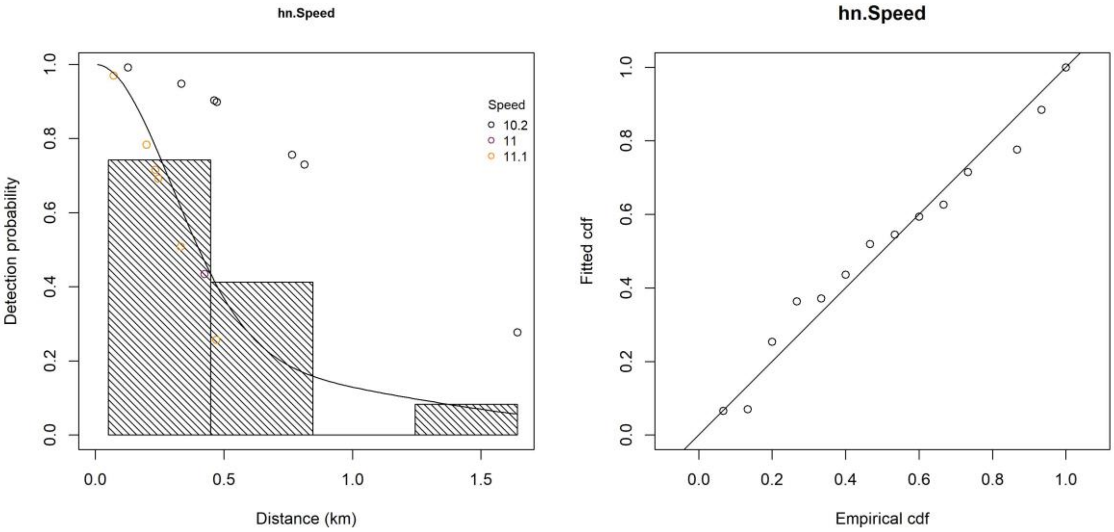


Figure C-248. Plot of the detection function (left) and QQ-Plot (right).

2.41. Platform Group G4 - None

2.41.1. Common dolphin

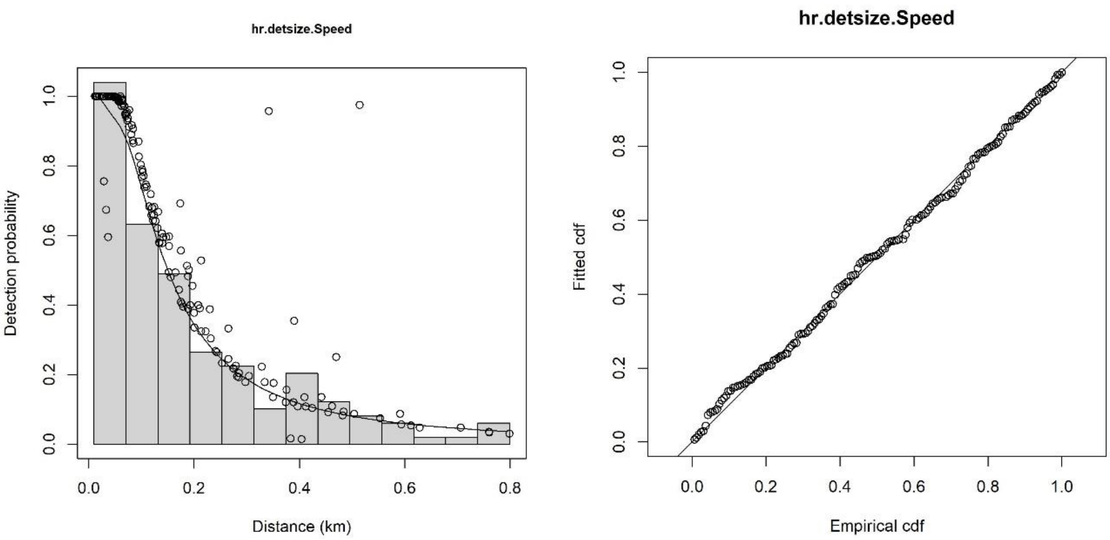


Figure C-249. Plot of the detection function (left) and QQ-Plot (right).

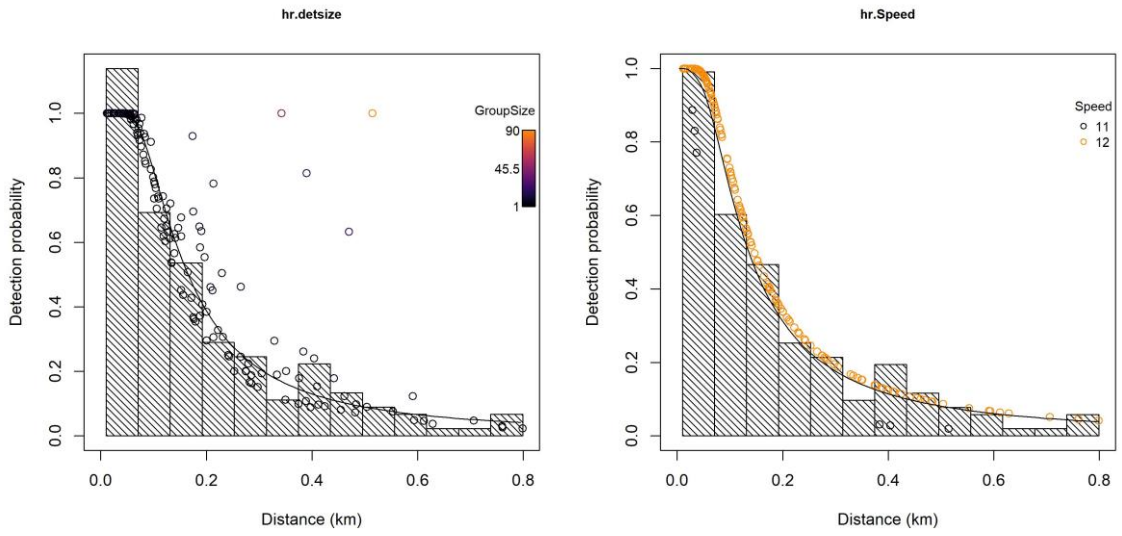


Figure C-250. Detection functions of the individual covariates.

2.41.2. Risso's dolphin

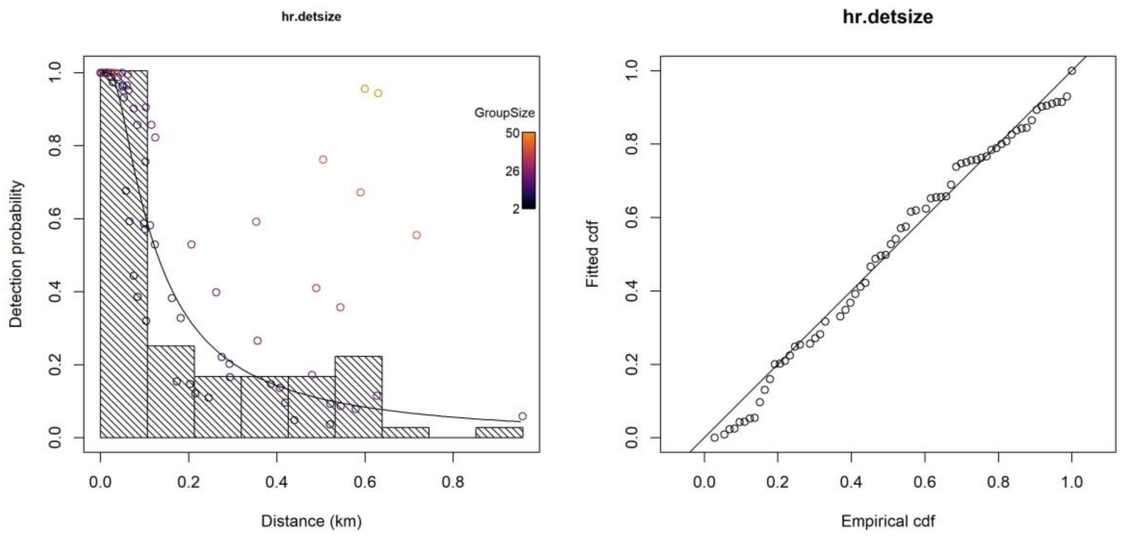


Figure C-251. Plot of the detection function (left) and QQ-Plot (right).

2.41.3. Harbor porpoise

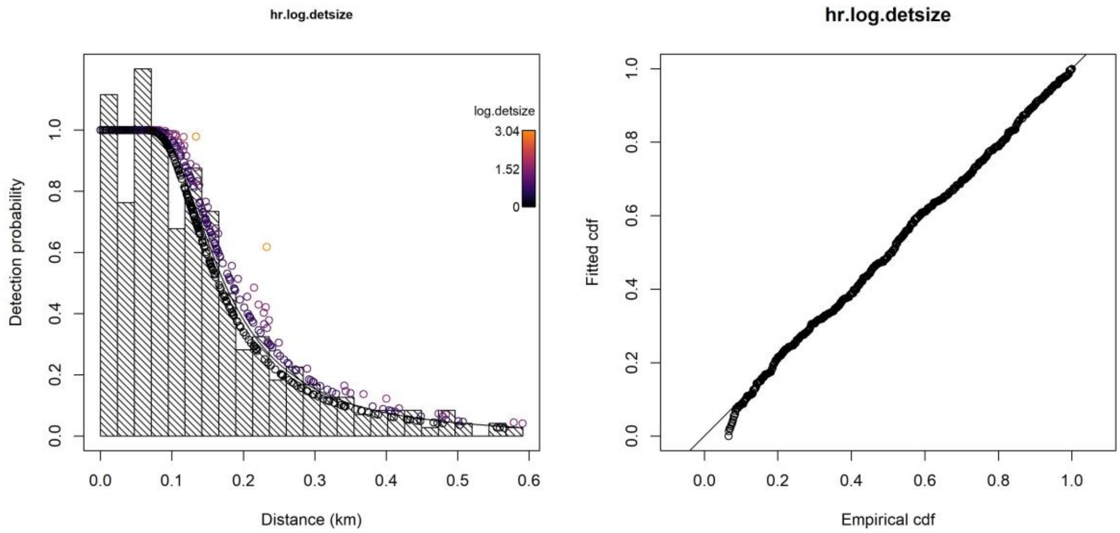


Figure C-252. Plot of the detection function (left) and QQ-Plot (right).

2.41.4. Striped dolphin

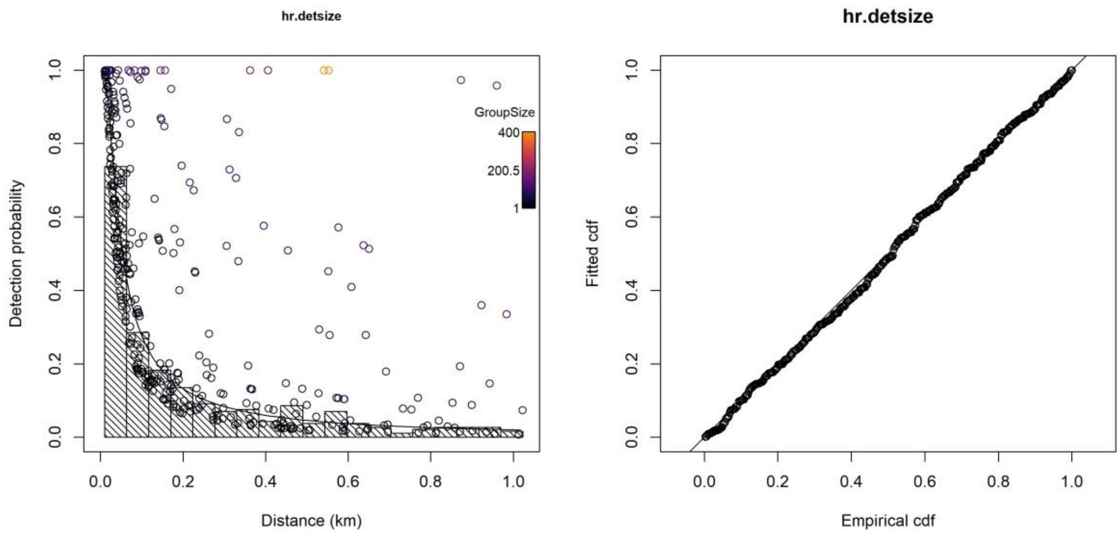


Figure C-253. Plot of the detection function (left) and QQ-Plot (right).

2.41.5. Bottlenose dolphin

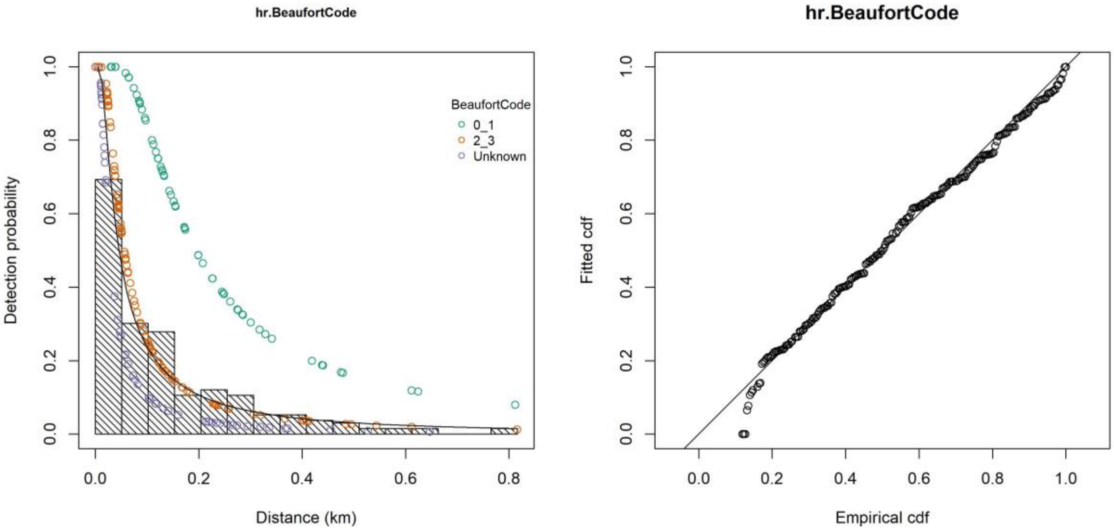


Figure C-254. Plot of the detection function (left) and QQ-Plot (right).

2.41.6. Unidentified dolphin

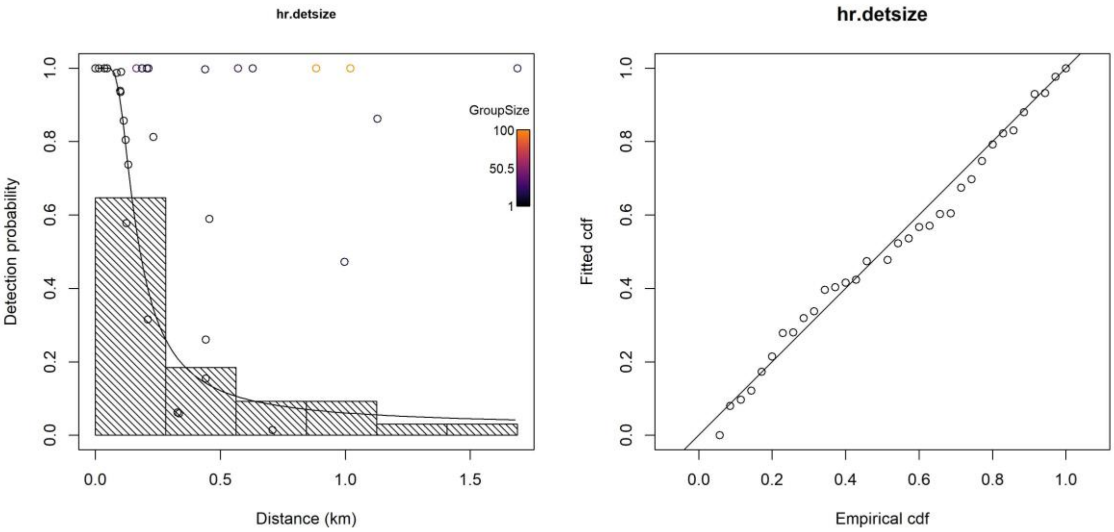


Figure C-255. Plot of the detection function (left) and QQ-Plot (right).

2.42. Platform Group G5 - 10_11

2.42.1. Fin whale

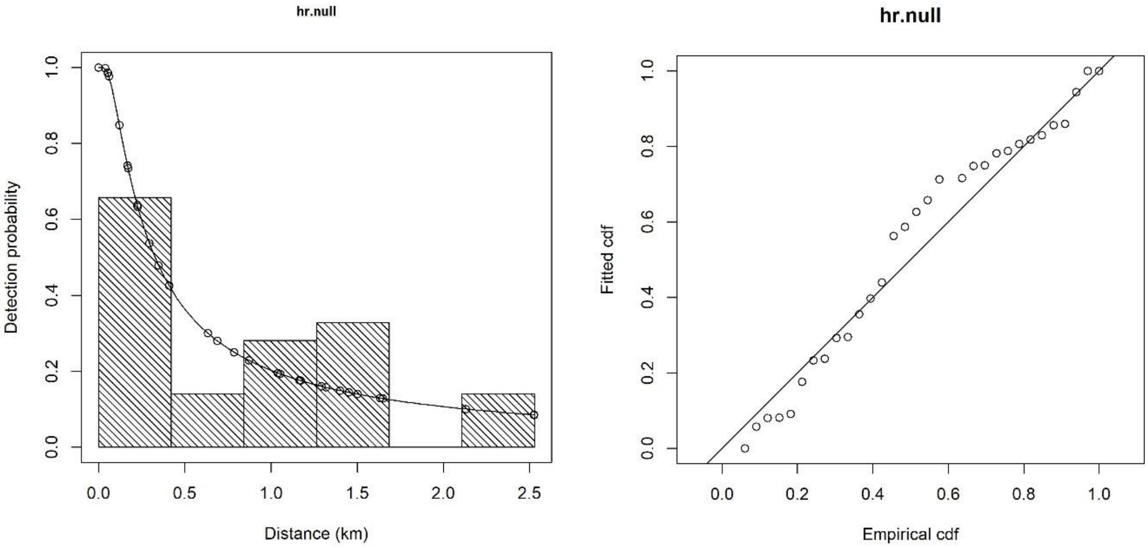


Figure C-256. Plot of the detection function (left) and QQ-Plot (right).

2.42.2. Common dolphin

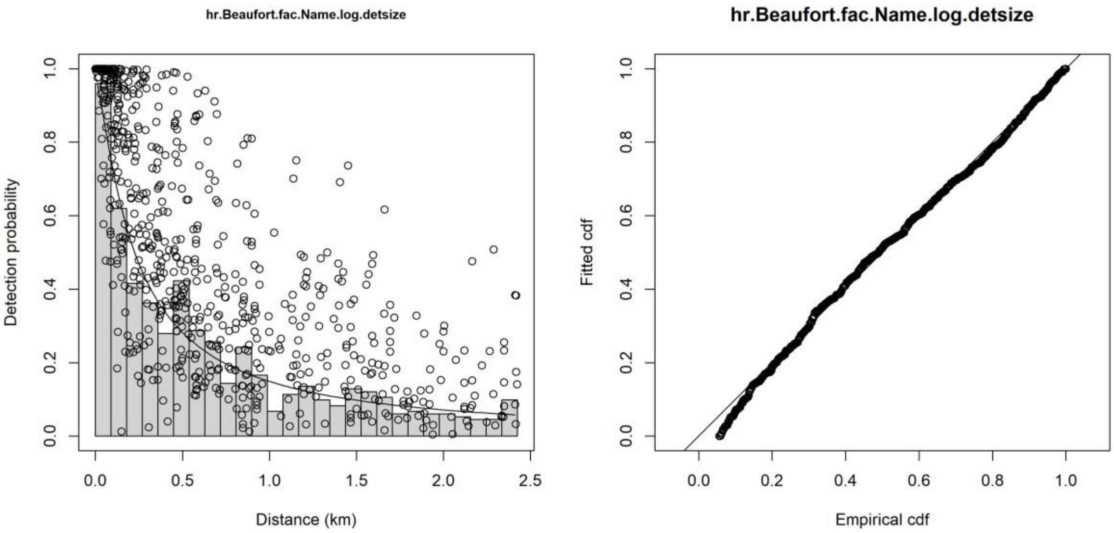
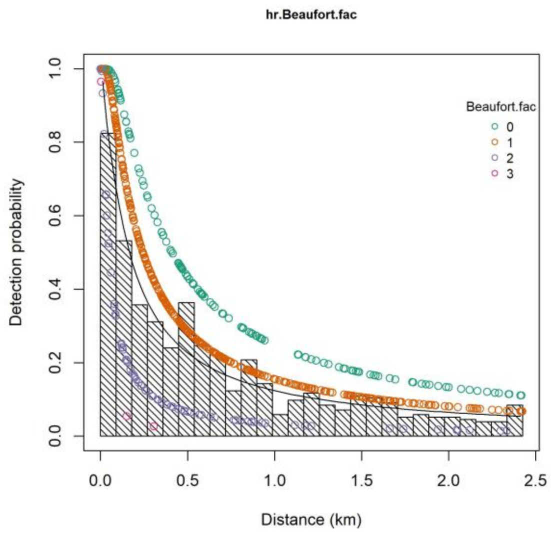


Figure C-257. Plot of the detection function (left) and QQ-Plot (right).



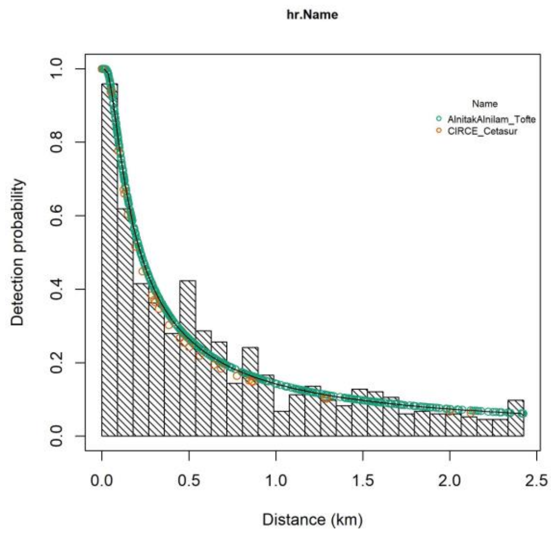


Figure C-258. Detection functions of the individual covariates.

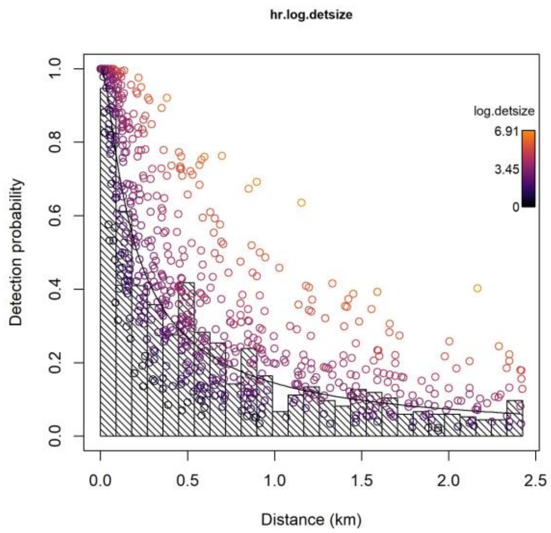


Figure C-259. Detection functions of the individual covariates.

2.42.3. Risso’s dolphin

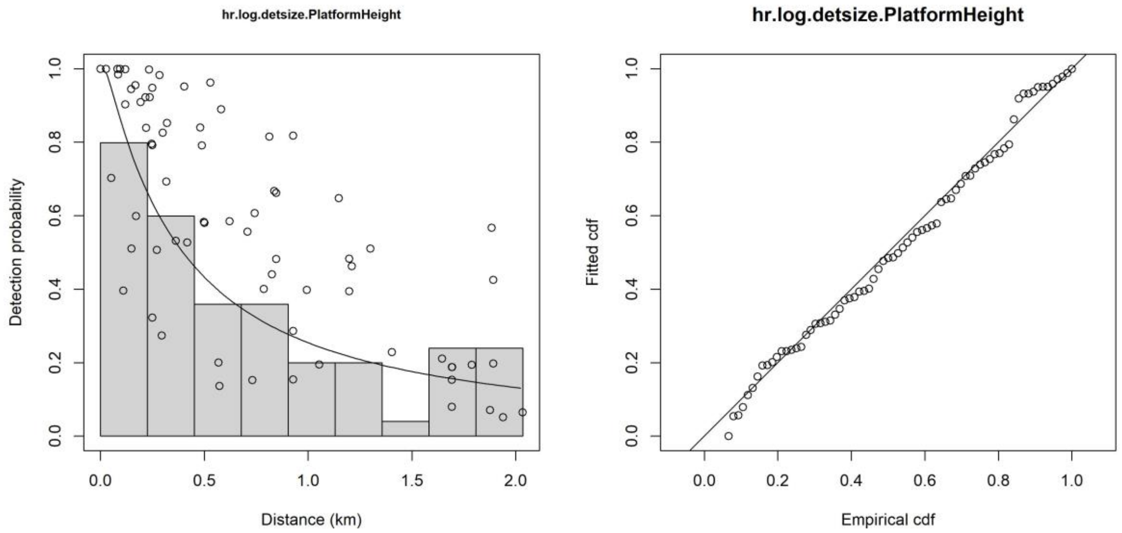


Figure C-260. Plot of the detection function (left) and QQ-Plot (right).

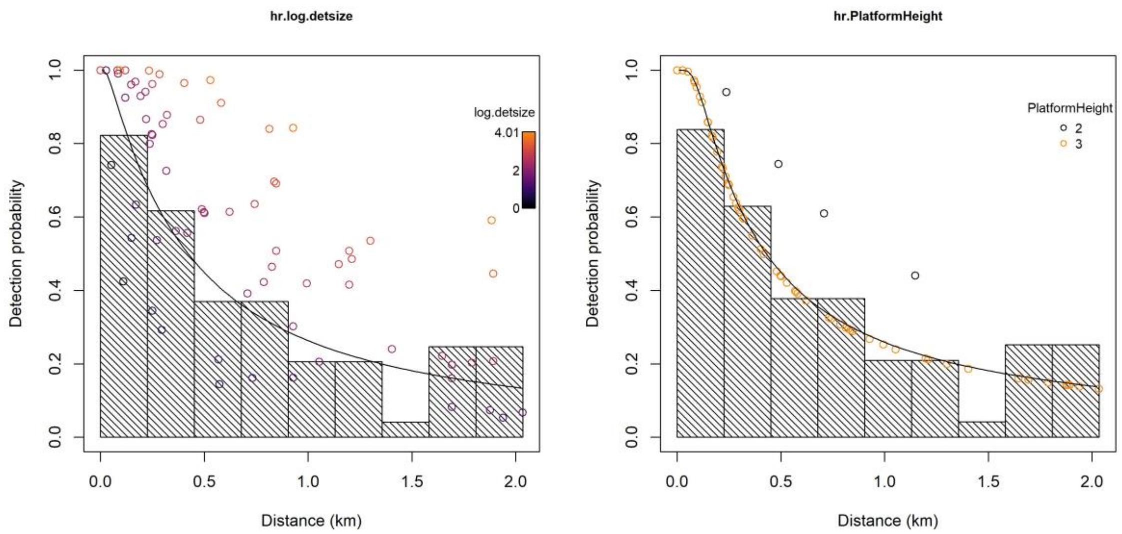


Figure C-261. Detection functions of the individual covariates.

2.42.4. Long-finned pilot whale

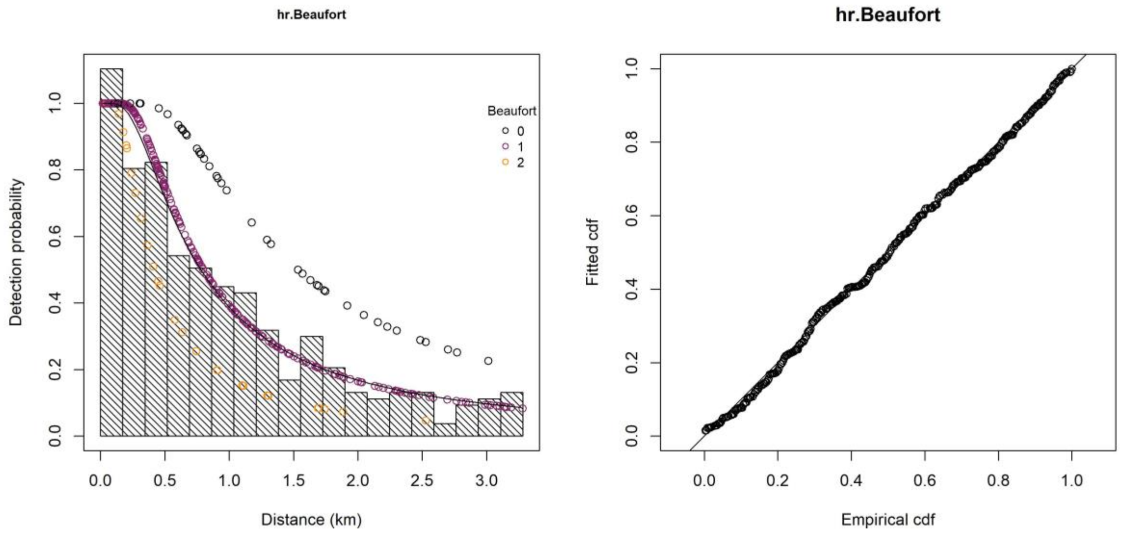


Figure C-262. Plot of the detection function (left) and QQ-Plot (right).

2.42.5. Long-finned pilot whale - Killer whale - False killer whale

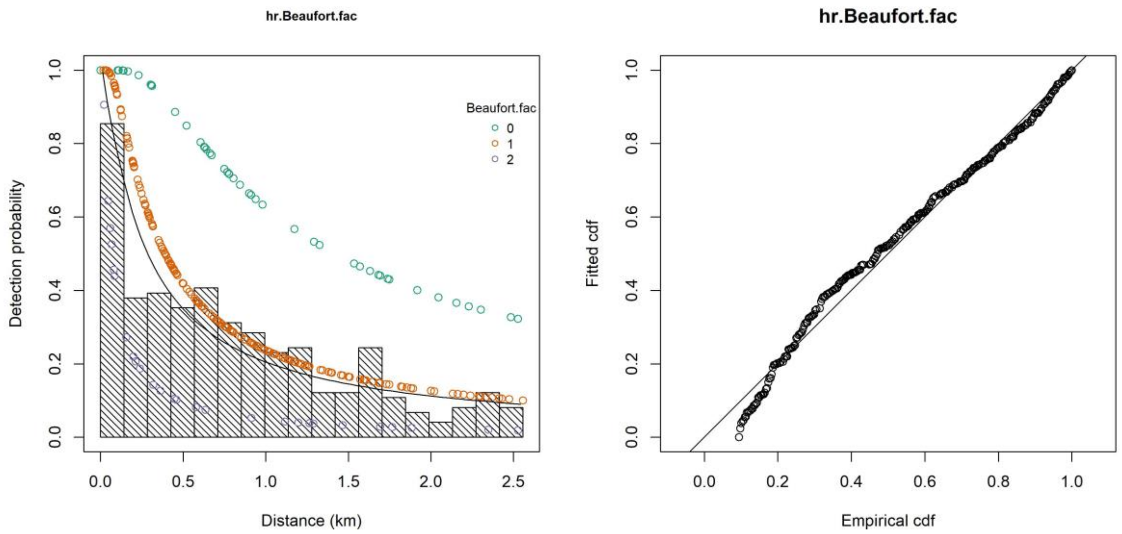


Figure C-263. Plot of the detection function (left) and QQ-Plot (right).

2.42.6. Sperm whale

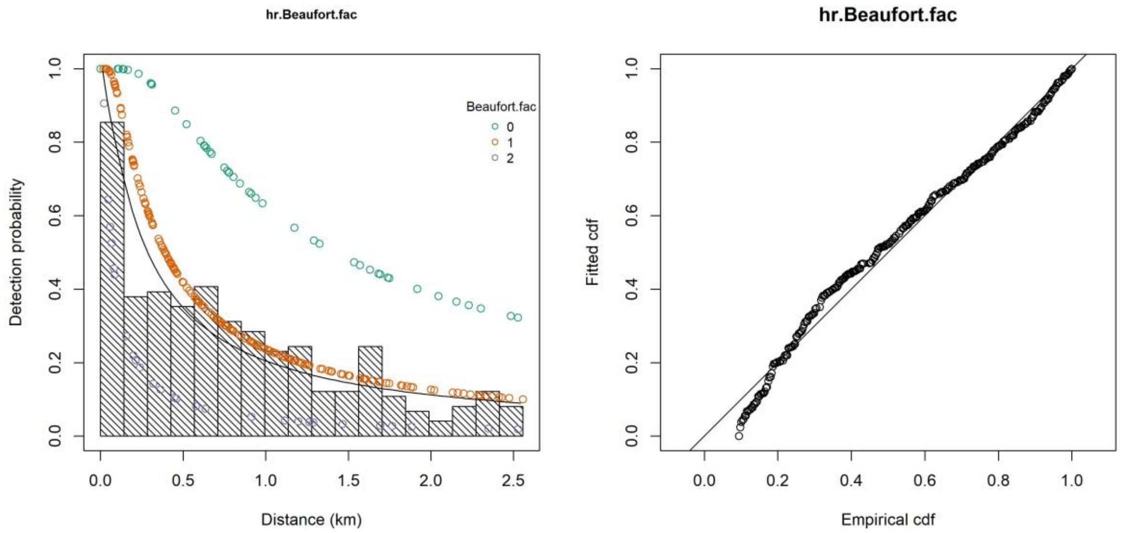


Figure C-264. Plot of the detection function (left) and QQ-Plot (right).

2.42.7. Striped dolphin

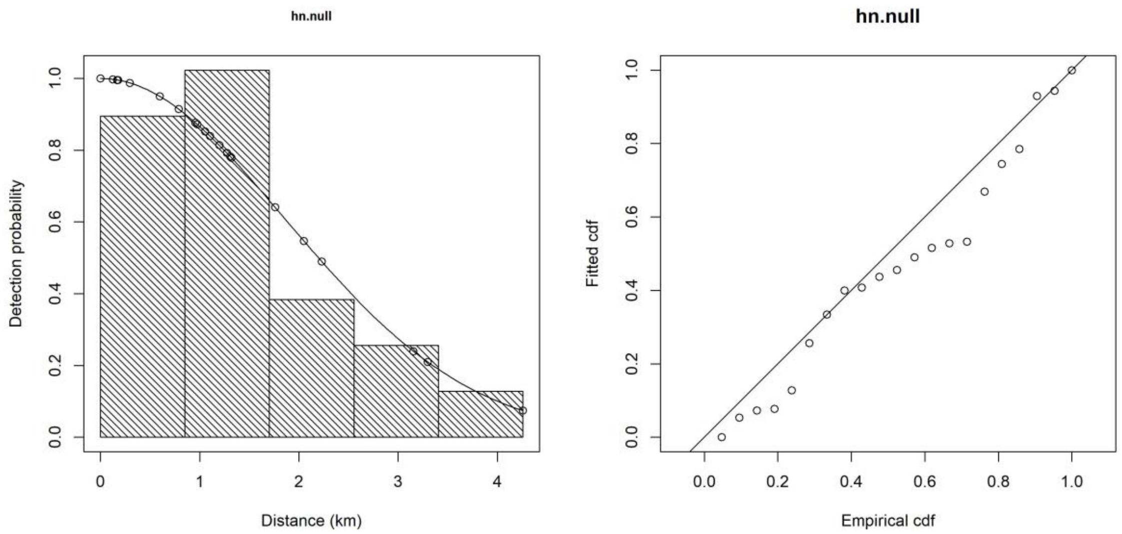


Figure C-265. Plot of the detection function (left) and QQ-Plot (right).

2.42.8. Bottlenose dolphin

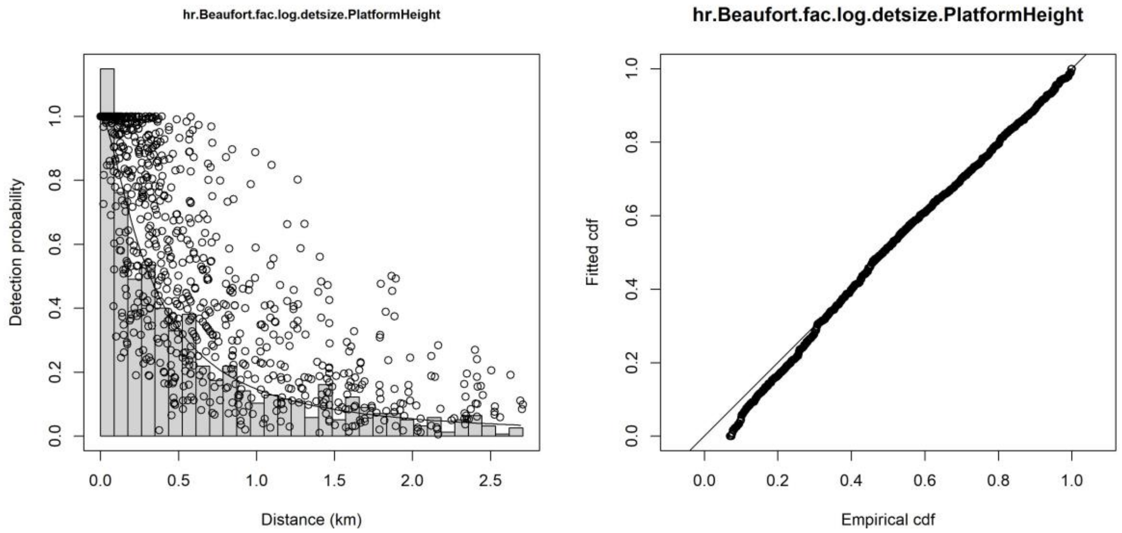


Figure C-266. Plot of the detection function (left) and QQ-Plot (right).

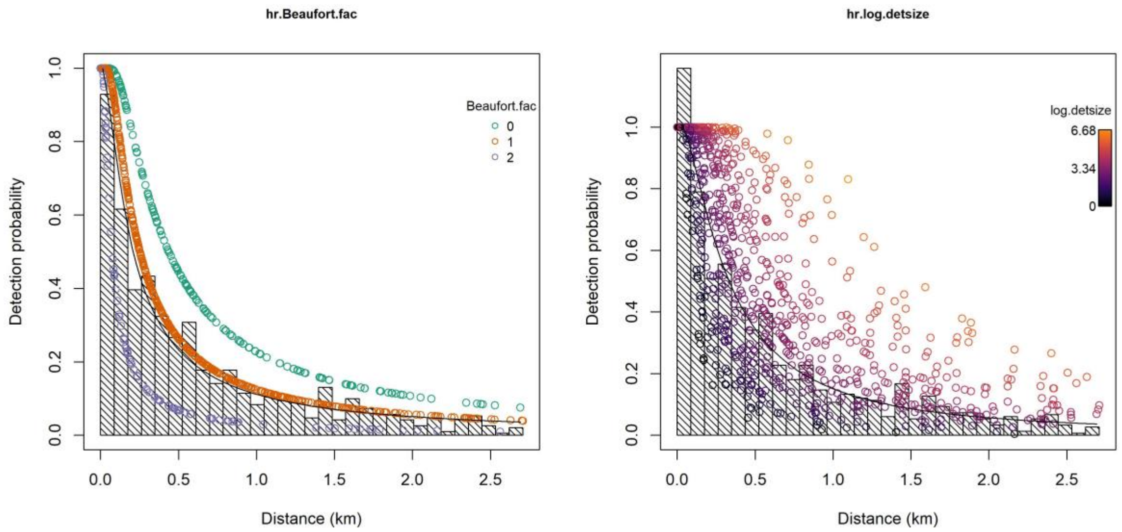


Figure C-267. Detection functions of the individual covariates.

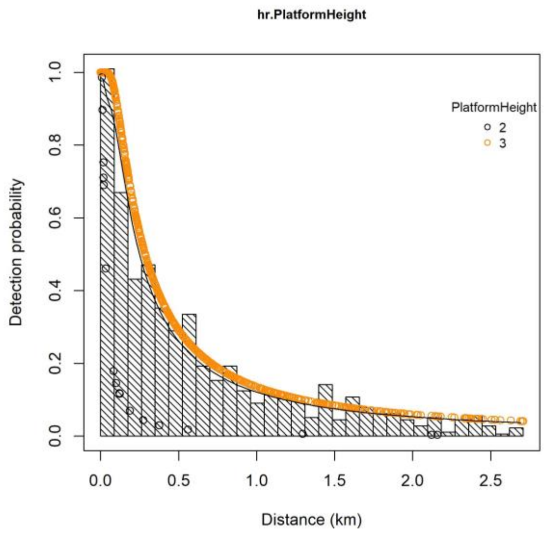


Figure C-268. Detection functions of the individual covariates.

2.42.9. Unidentified dolphin

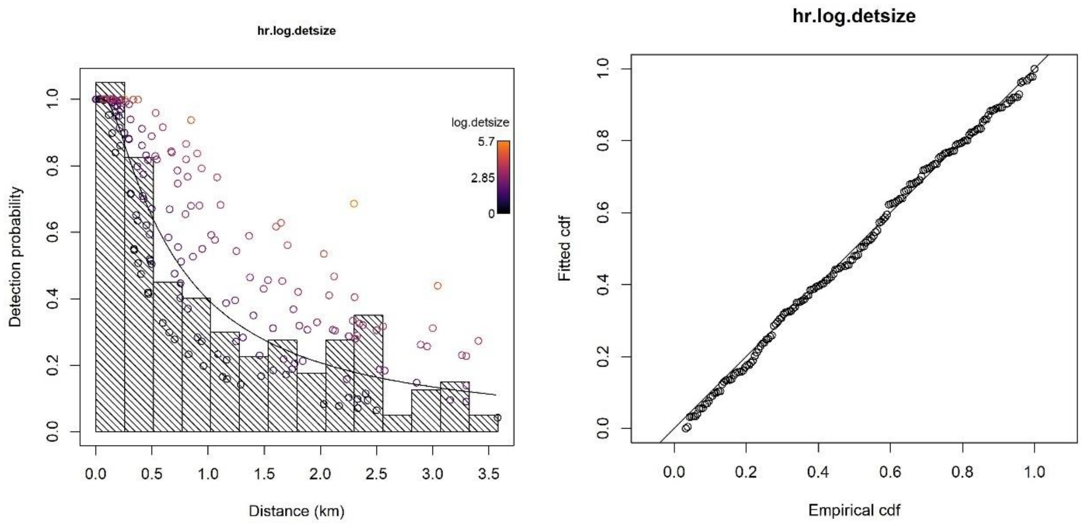


Figure C-269. Plot of the detection function (left) and QQ-Plot (right).

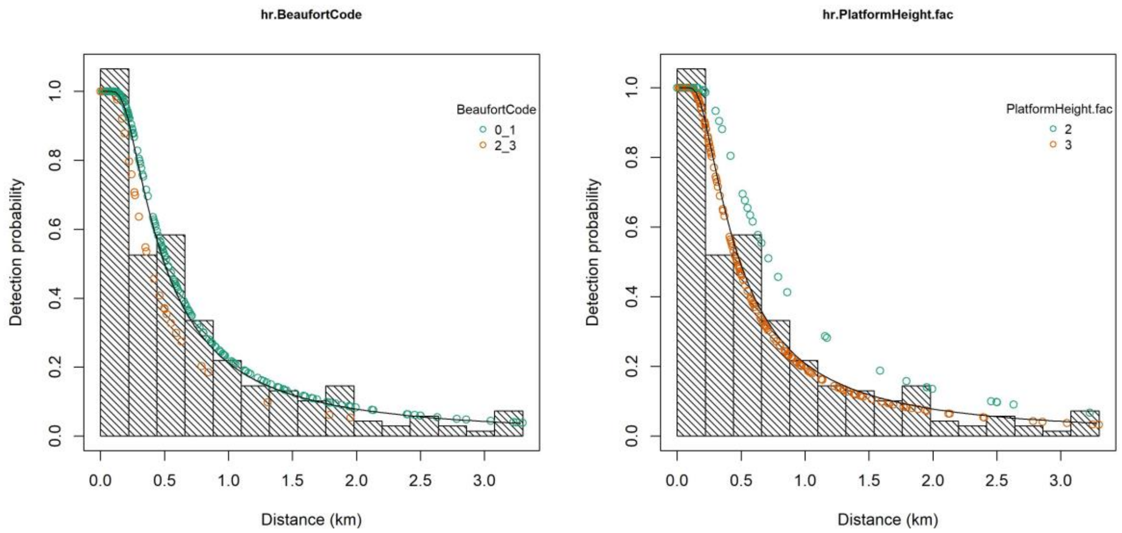


Figure C-270. Detection functions of the individual covariates.

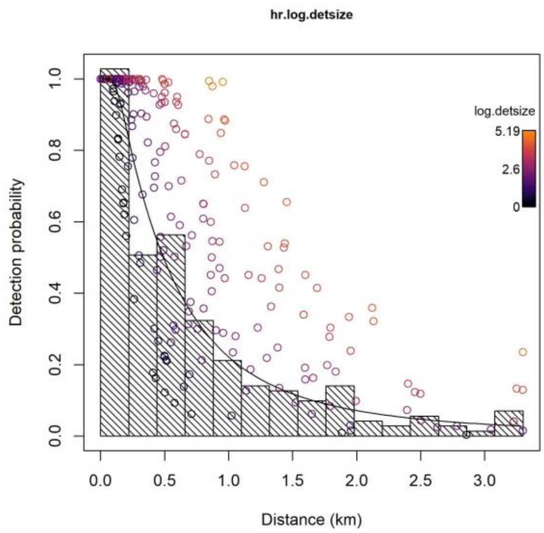


Figure C-271. Detection functions of the individual covariates.

2.42.10. Cuvier's beaked whale

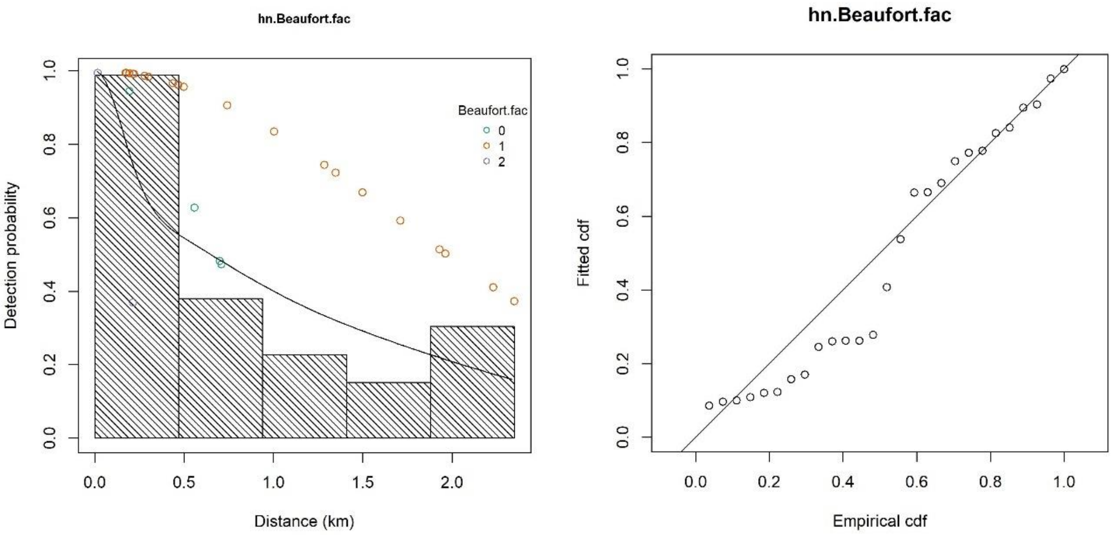


Figure C-272. Plot of the detection function (left) and QQ-Plot (right).

2.42.11. Unidentified beaked whale

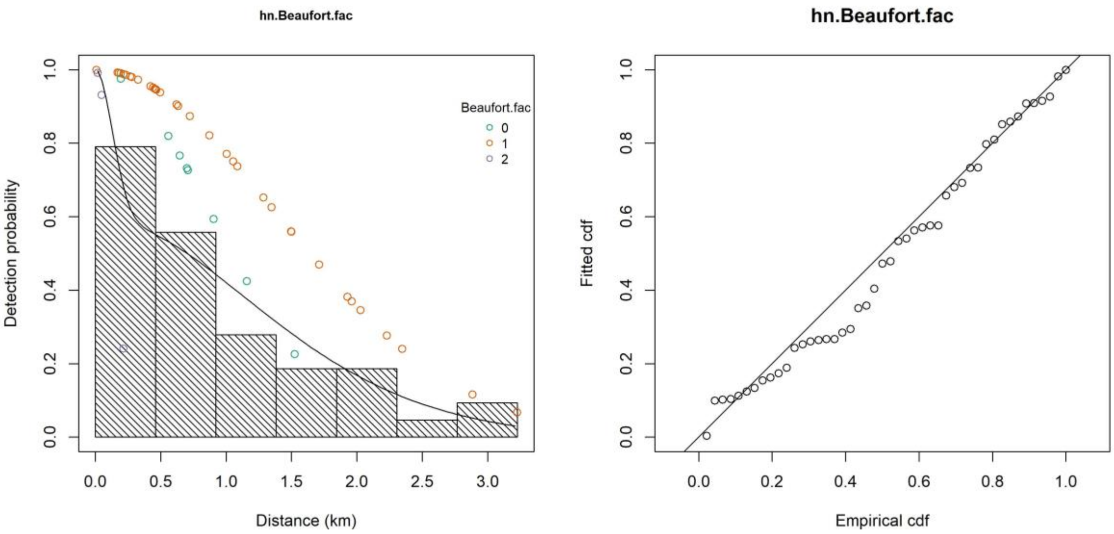


Figure C-273. Plot of the detection function (left) and QQ-Plot (right).

2.43. Platform Group G5 - 3_5

2.43.1. Fin whale

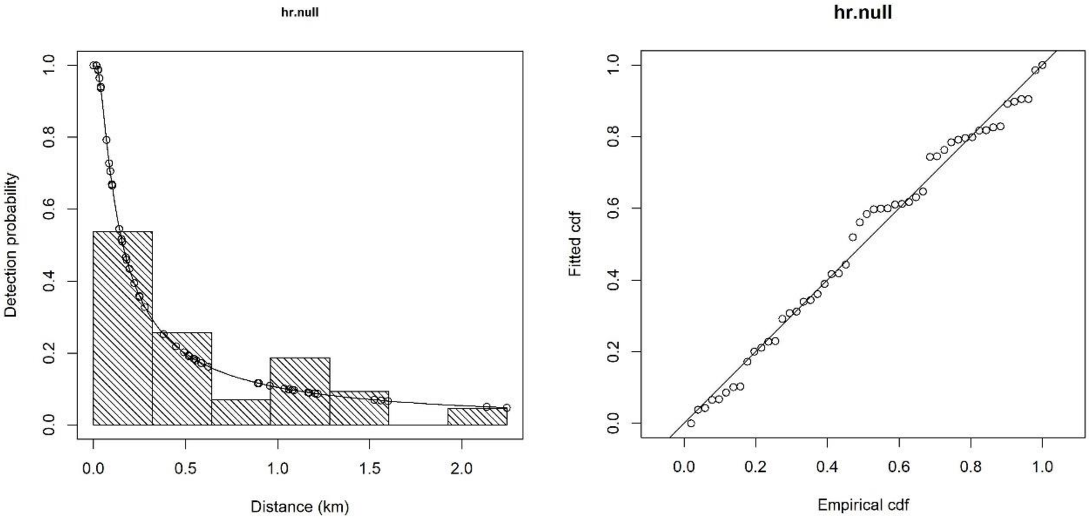


Figure C-274. Plot of the detection function (left) and QQ-Plot (right).

2.43.2. Common dolphin

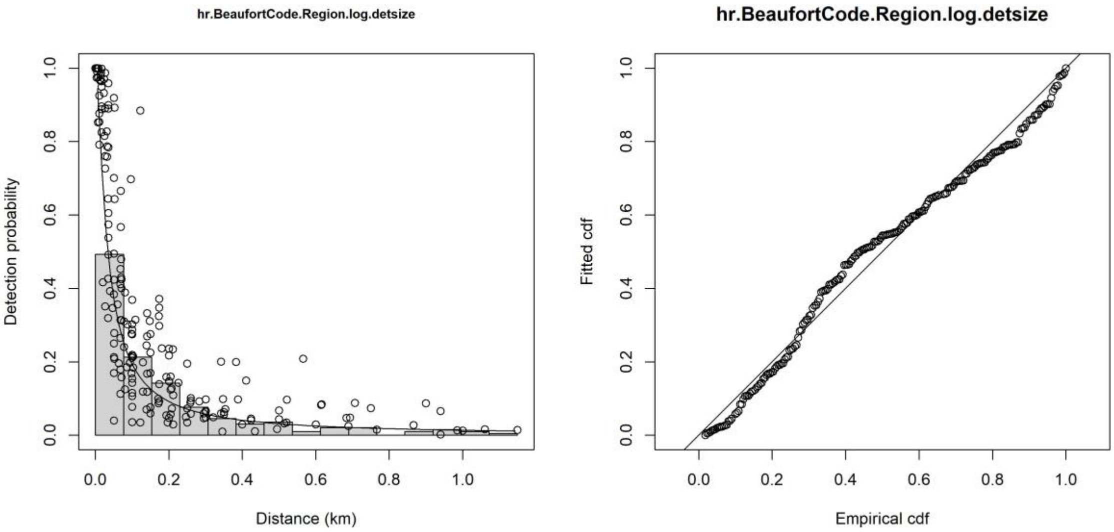


Figure C-275. Plot of the detection function (left) and QQ-Plot (right).

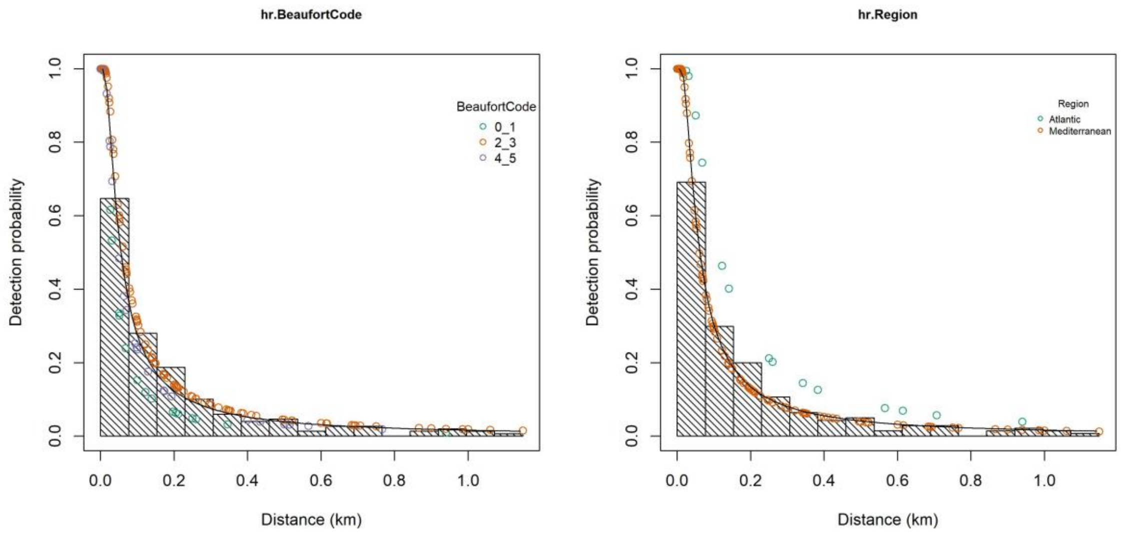


Figure C-276. Detection functions of the individual covariates.

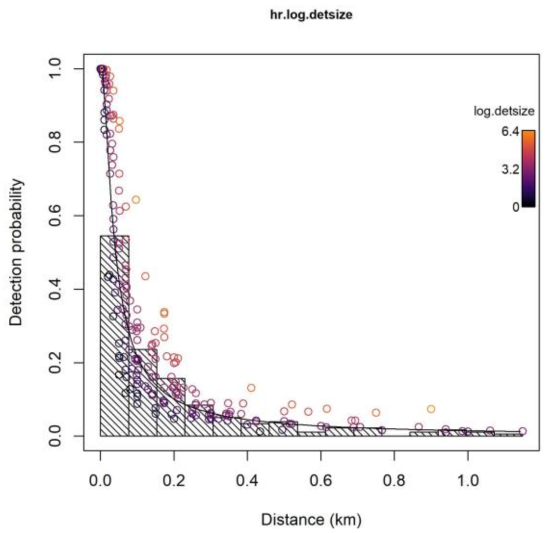


Figure C-277. Detection functions of the individual covariates.

2.43.3. Long-finned pilot whale

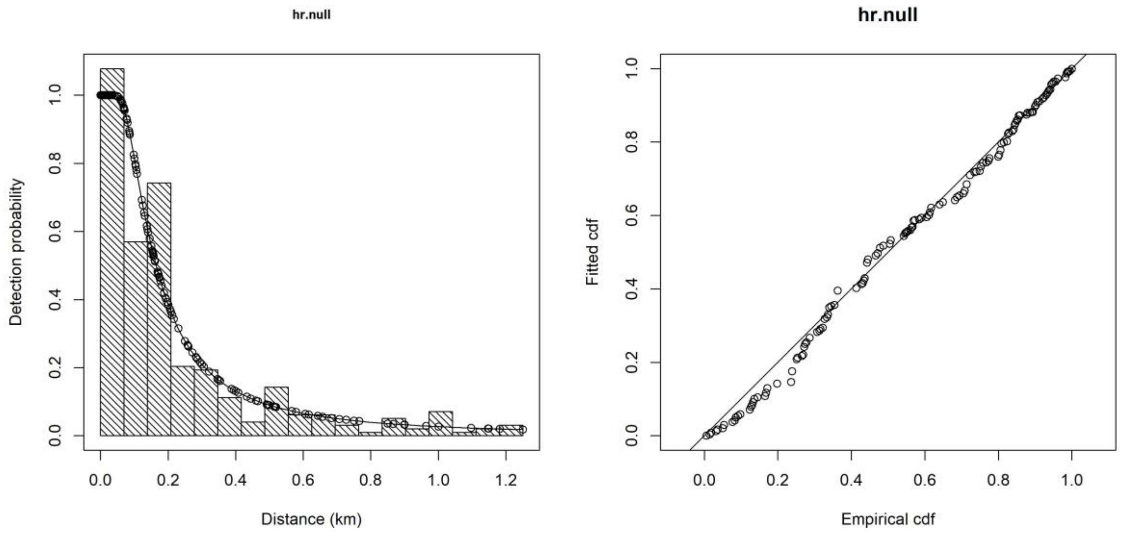


Figure C-278. Plot of the detection function (left) and QQ-Plot (right).

2.43.4. Killer whale

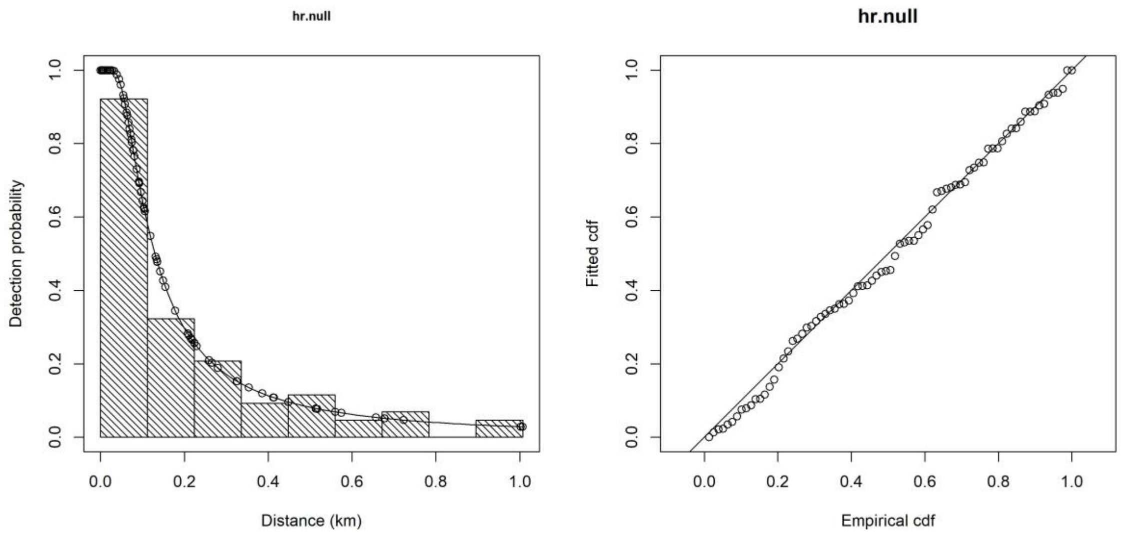


Figure C-279. Plot of the detection function (left) and QQ-Plot (right).

2.43.5. Sperm whale

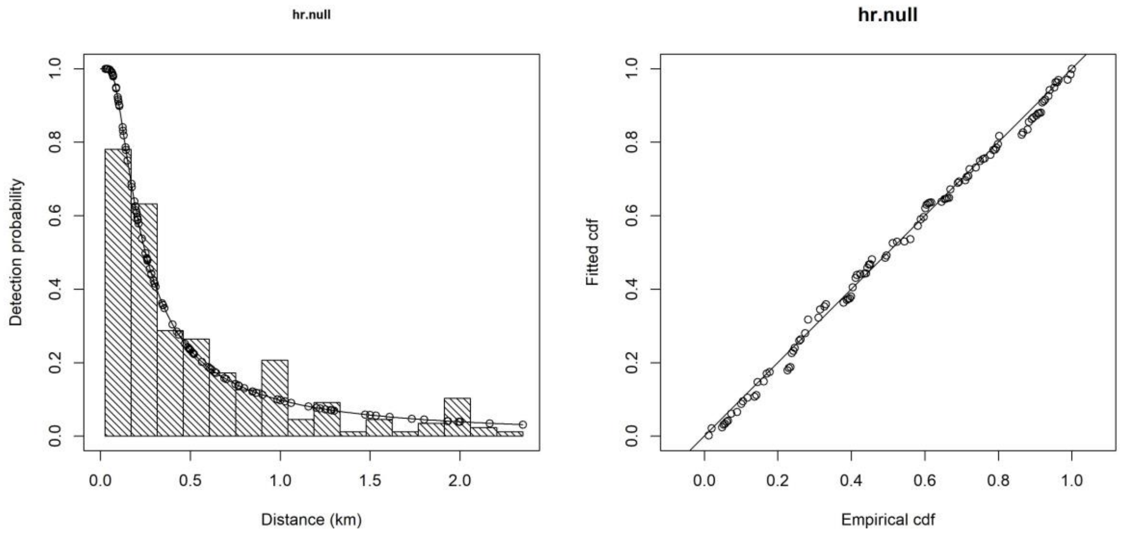


Figure C-280. Plot of the detection function (left) and QQ-Plot (right).

2.43.6. Striped dolphin

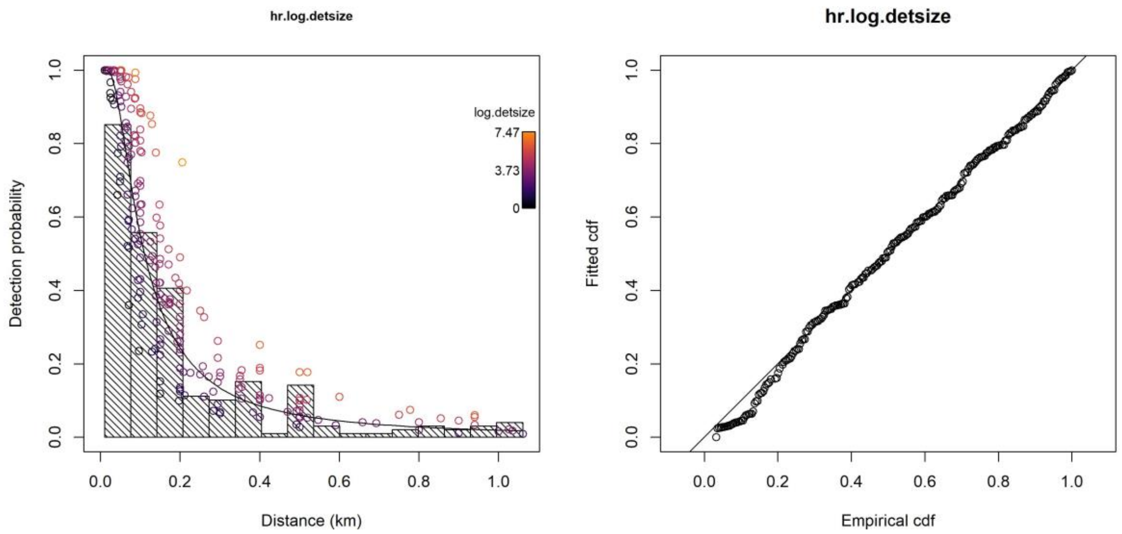


Figure C-281. Plot of the detection function (left) and QQ-Plot (right).

2.43.7. Bottlenose dolphin

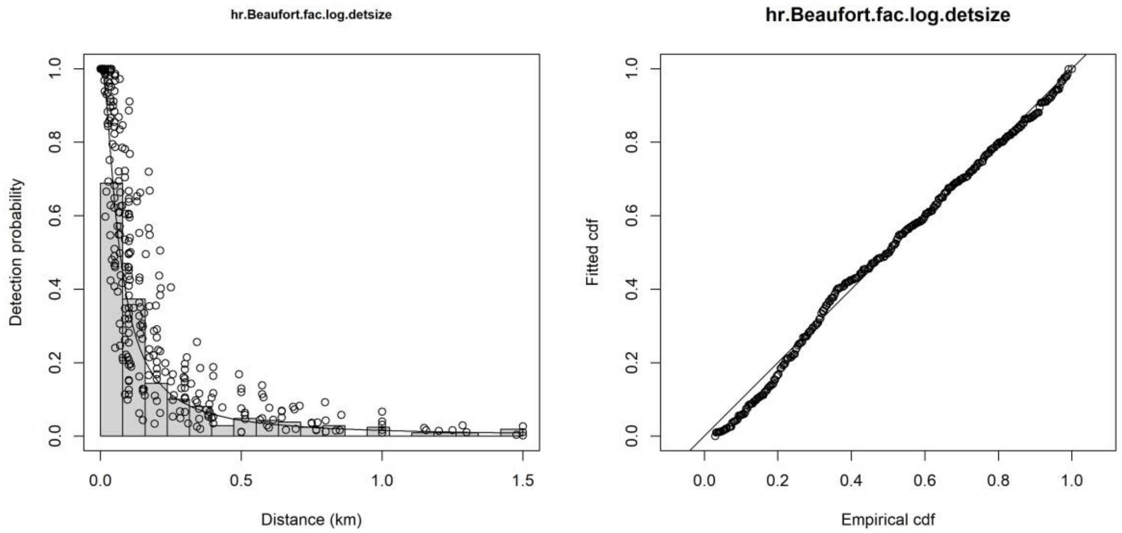


Figure C-282. Plot of the detection function (left) and QQ-Plot (right).

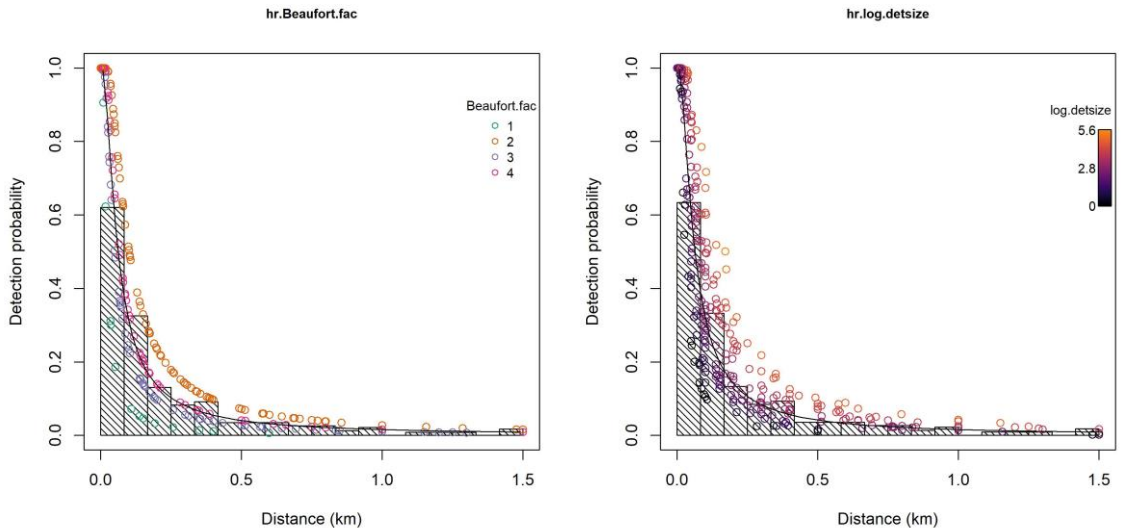


Figure C-283. Detection functions of the individual covariates.

2.43.8. Bottlenose dolphin - Risso's dolphin

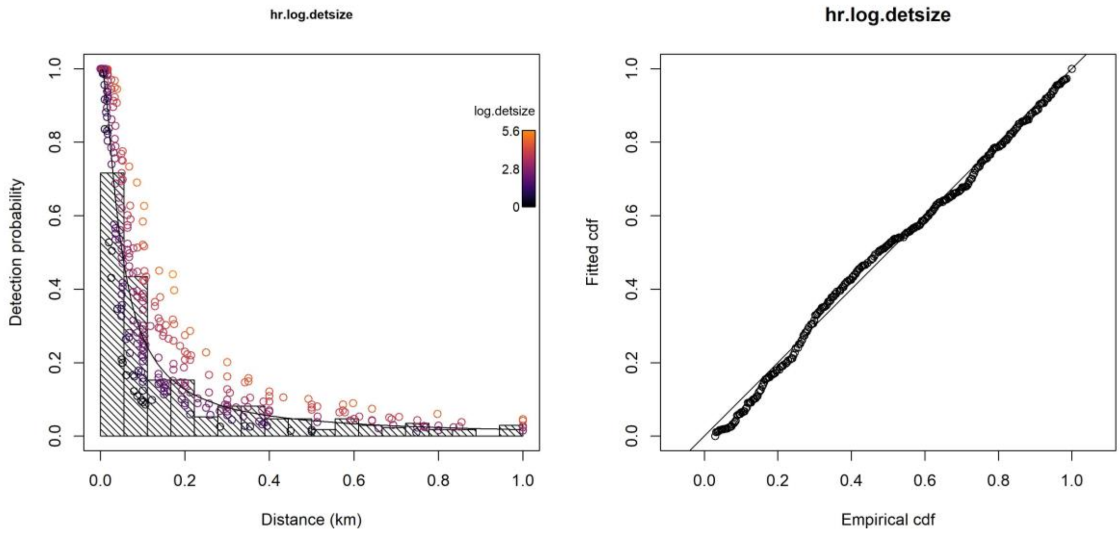


Figure C-284. Plot of the detection function (left) and QQ-Plot (right).

2.44. Platform Group G5 - 6_8

2.44.1. Common dolphin

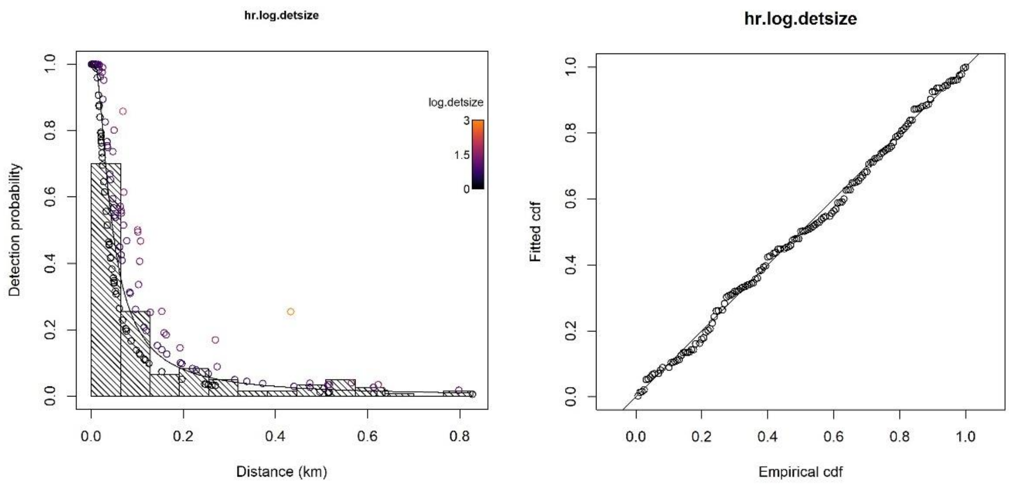


Figure C-285. Plot of the detection function (left) and QQ-Plot (right).

2.44.2. Harbor porpoise

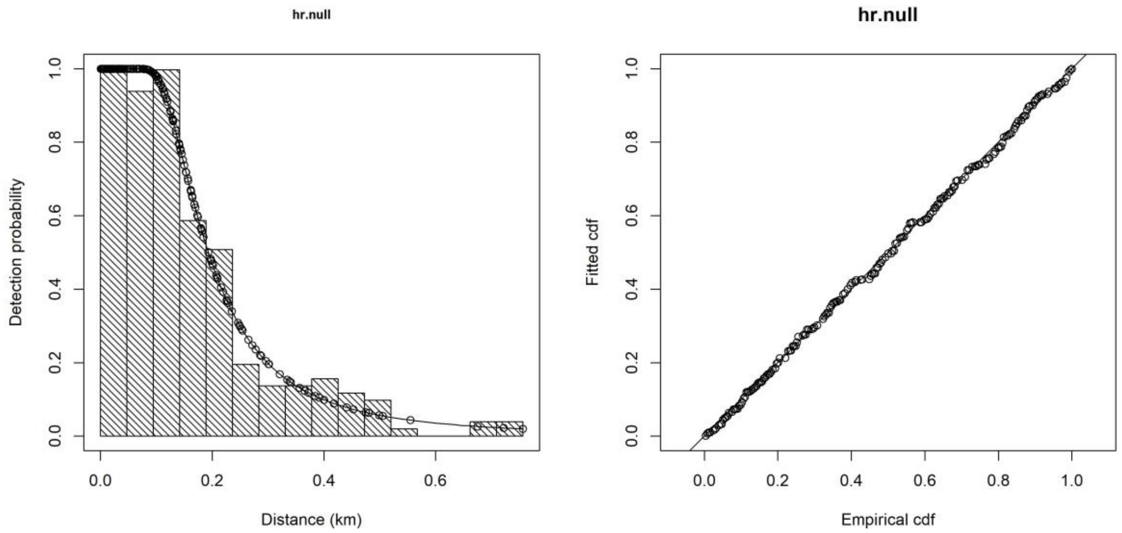


Figure C-286. Plot of the detection function (left) and QQ-Plot (right).

2.44.3. Bottlenose dolphin

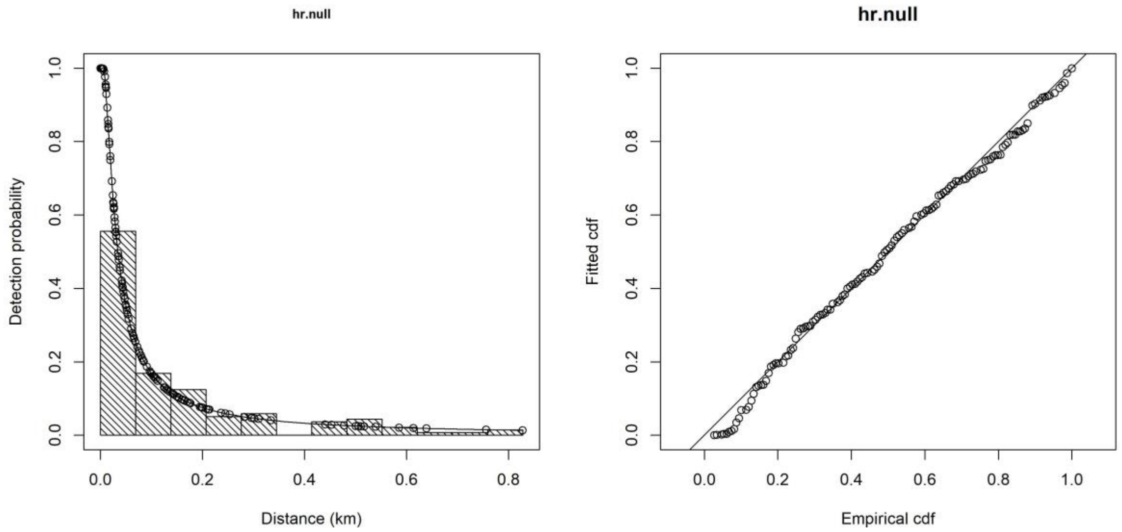


Figure C-287. Plot of the detection function (left) and QQ-Plot (right).

2.45. Platform Group G5 - All

2.45.1. Harbor porpoise

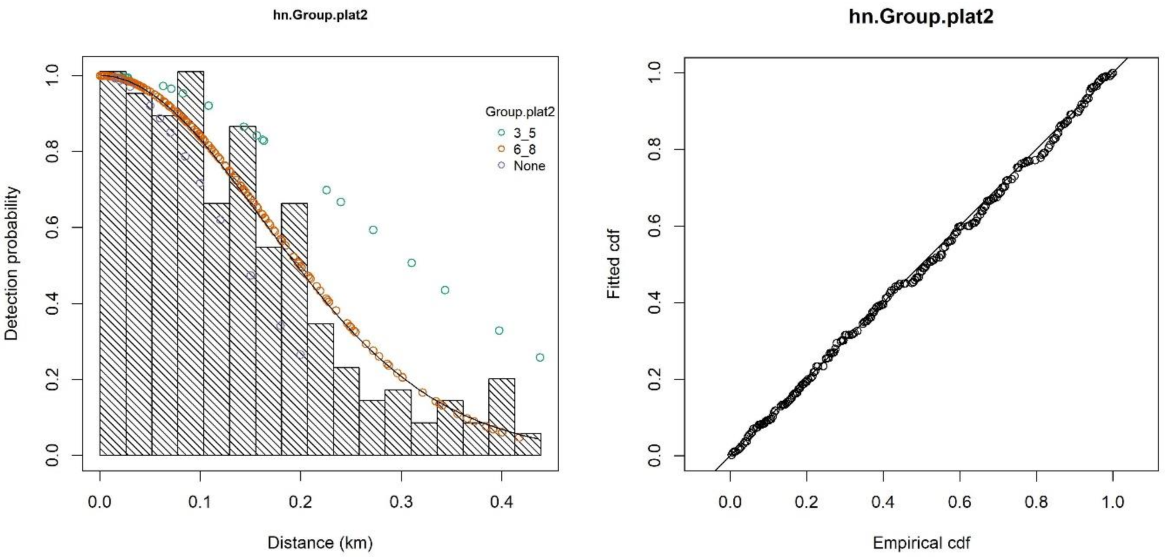


Figure C-288. Plot of the detection function (left) and QQ-Plot (right).

2.46. Platform Group G5 - G8 - None

2.46.1. Cuvier's beaked whale

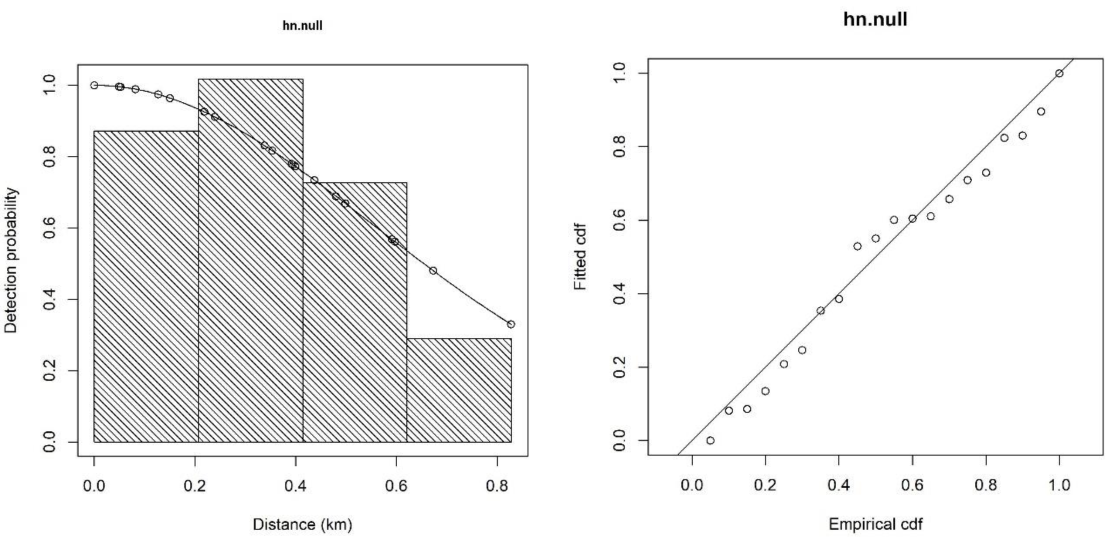


Figure C-289. Plot of the detection function (left) and QQ-Plot (right).

2.47. Platform Group G5 - G9 - G11 - None

2.47.1. Fin whale

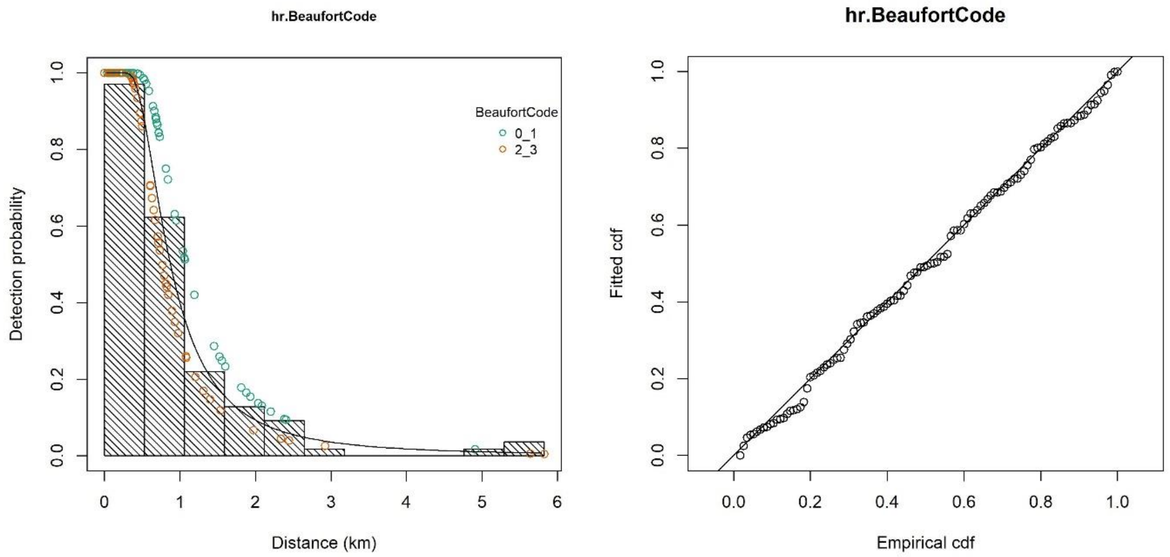


Figure C-290. Plot of the detection function (left) and QQ-Plot (right).

2.48. Platform Group G5 - None

2.48.1. Fin whale

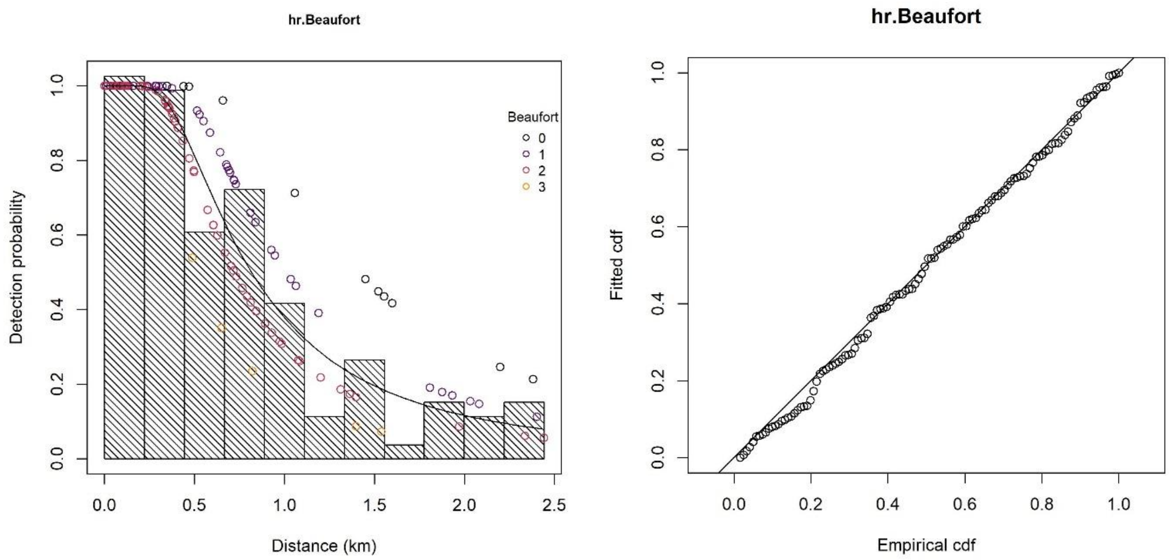


Figure C-291. Plot of the detection function (left) and QQ-Plot (right).

2.48.2. Common dolphin

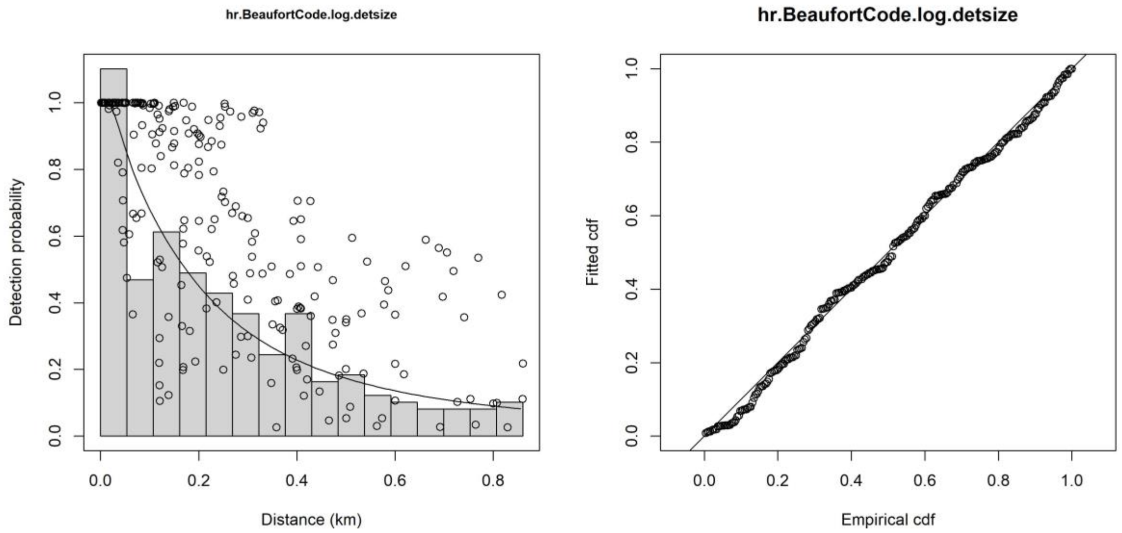


Figure C-292. Plot of the detection function (left) and QQ-Plot (right).

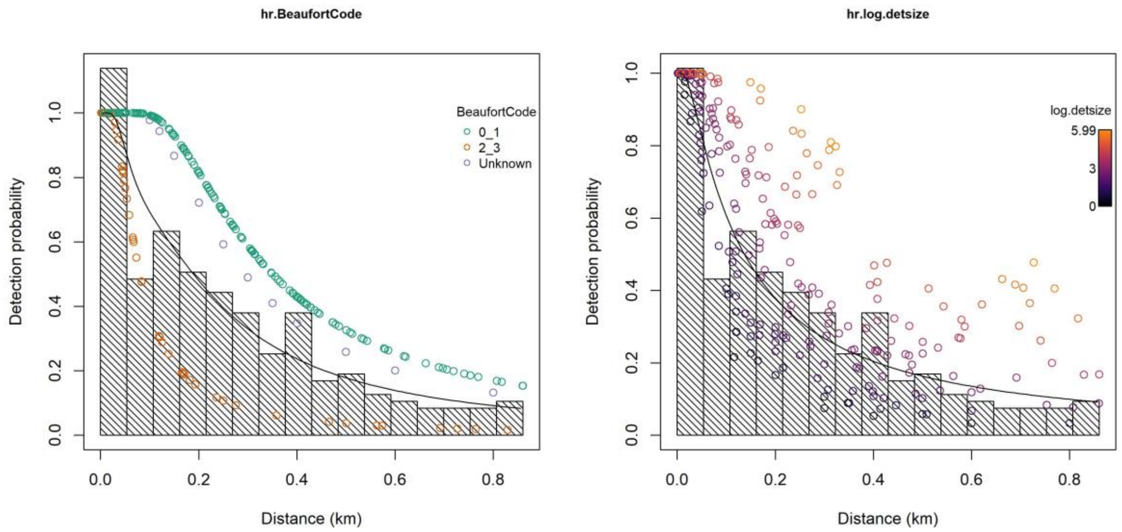


Figure C-293. Detection functions of the individual covariates.

2.48.3. Long-finned pilot whale

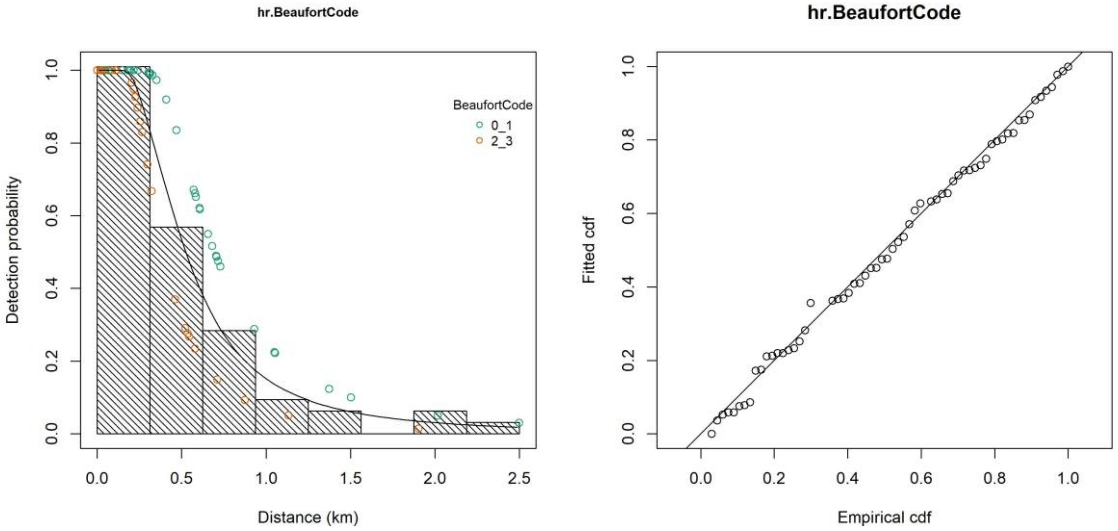


Figure C-294. Plot of the detection function (left) and QQ-Plot (right).

2.48.4. Long-finned pilot whale - Killer whale

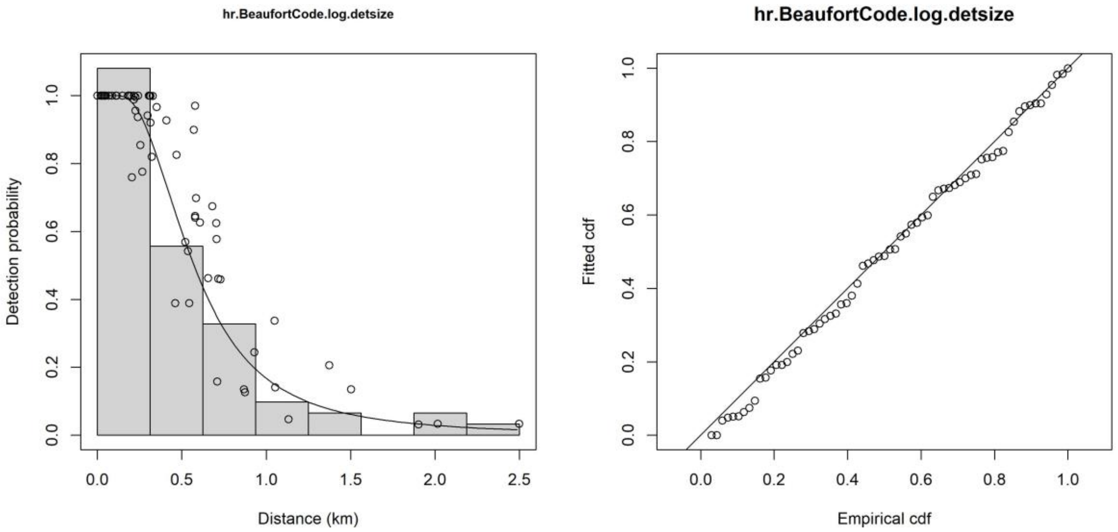


Figure C-295. Plot of the detection function (left) and QQ-Plot (right).

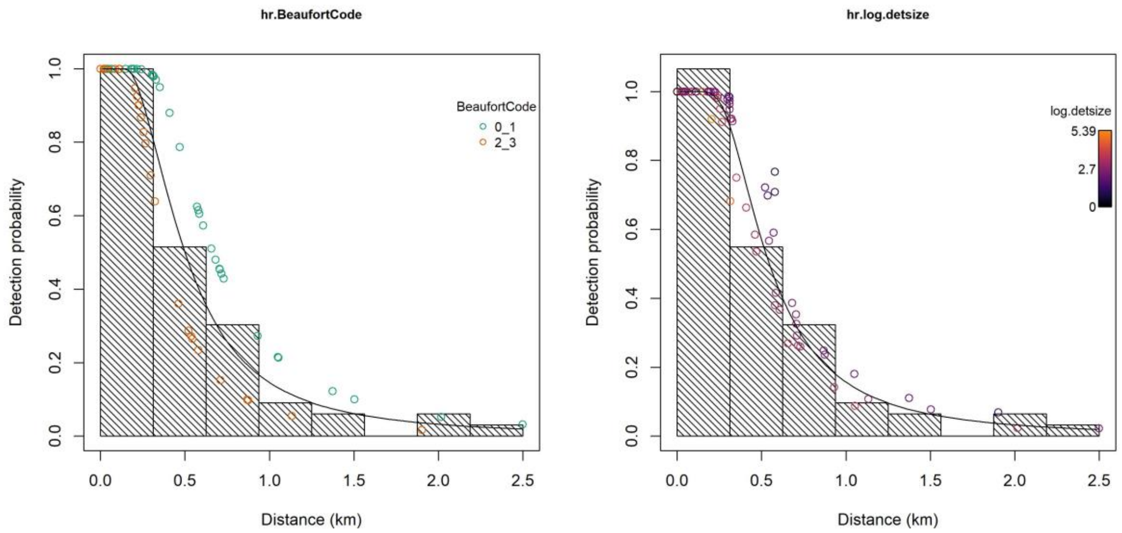


Figure C-296. Detection functions of the individual covariates.

2.48.5. Sperm whale

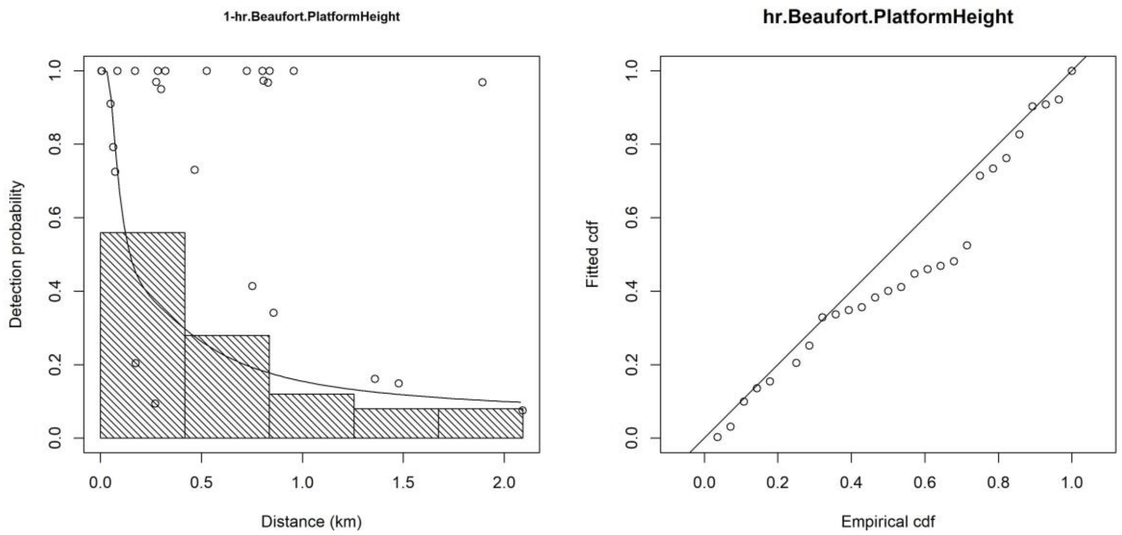
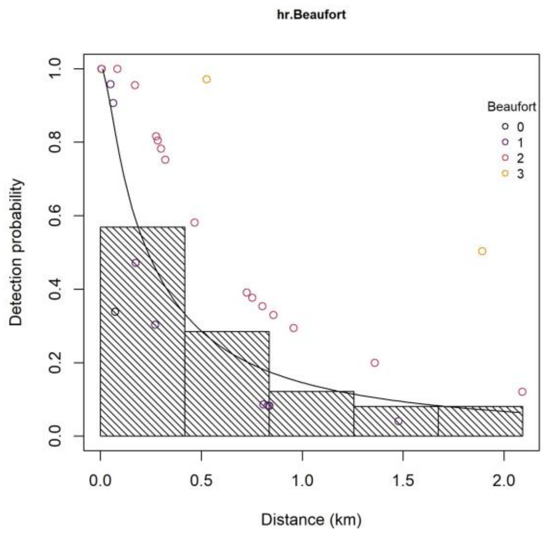


Figure C-297. Plot of the detection function (left) and QQ-Plot (right).



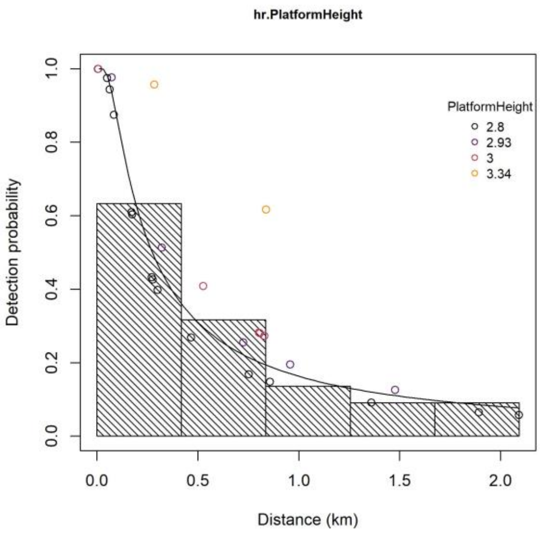
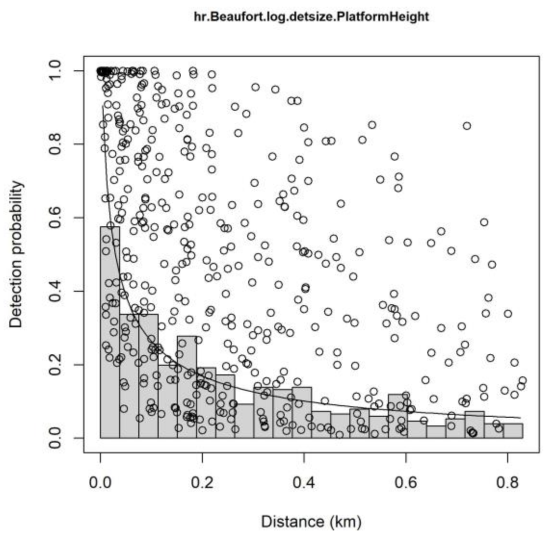


Figure C-298. Detection functions of the individual covariates.

2.48.6. Striped dolphin



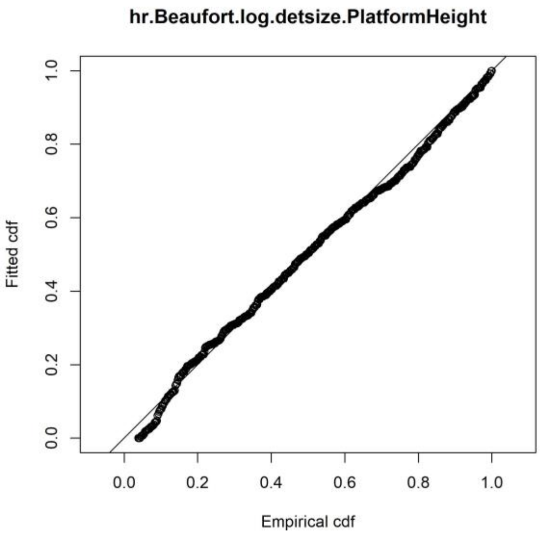


Figure C-299. Plot of the detection function (left) and QQ-Plot (right).

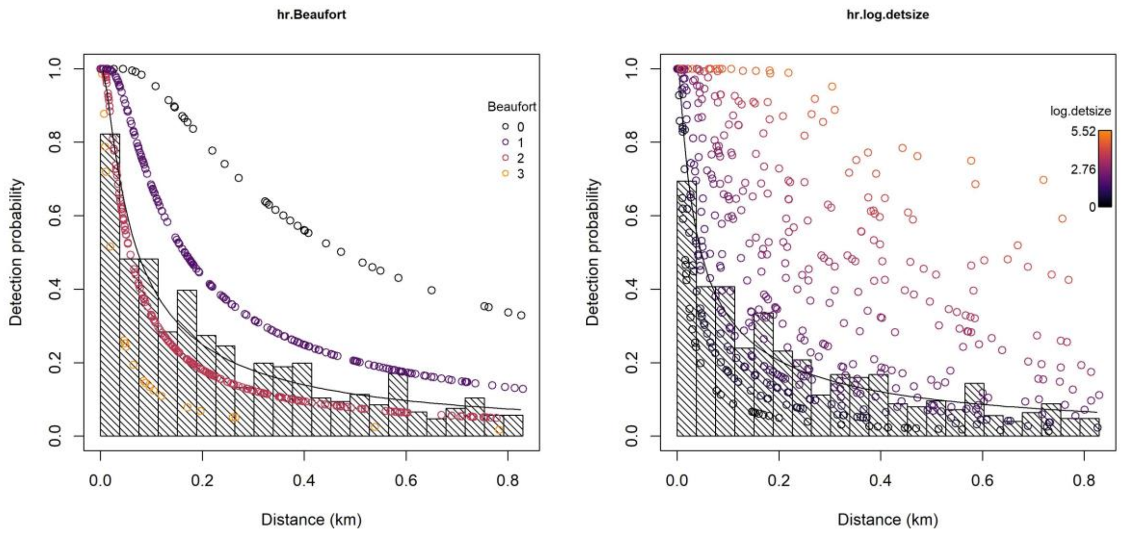


Figure C-300. Detection functions of the individual covariates.

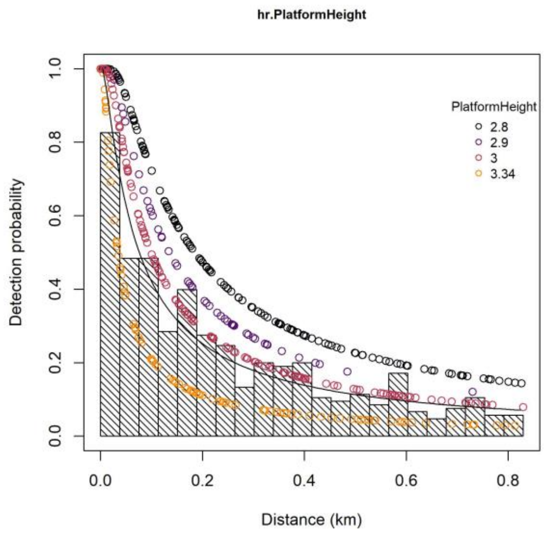


Figure C-301. Detection functions of the individual covariates.

2.48.7. Bottlenose dolphin

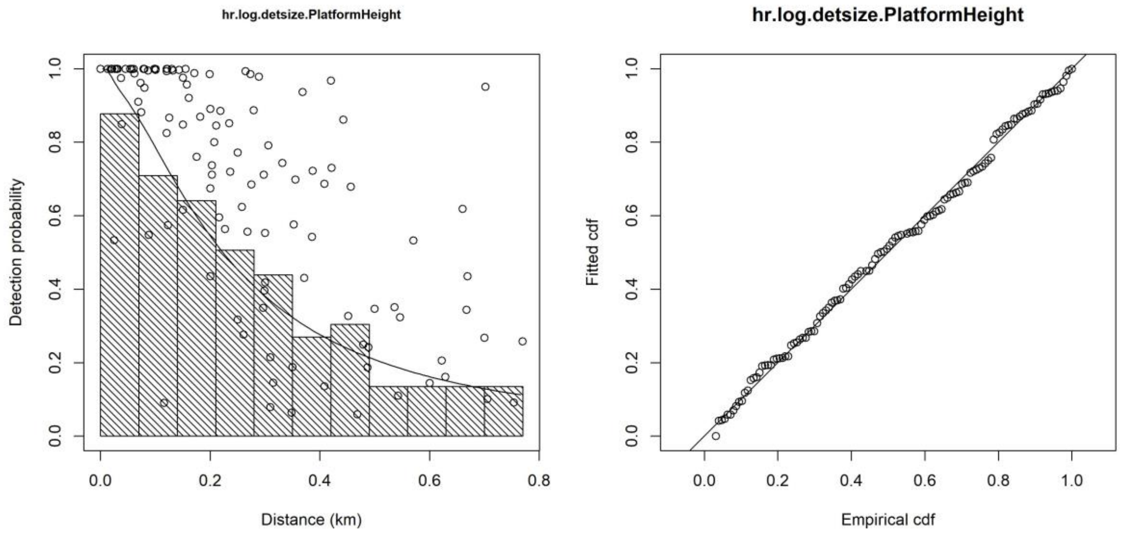


Figure C-302. Plot of the detection function (left) and QQ-Plot (right).

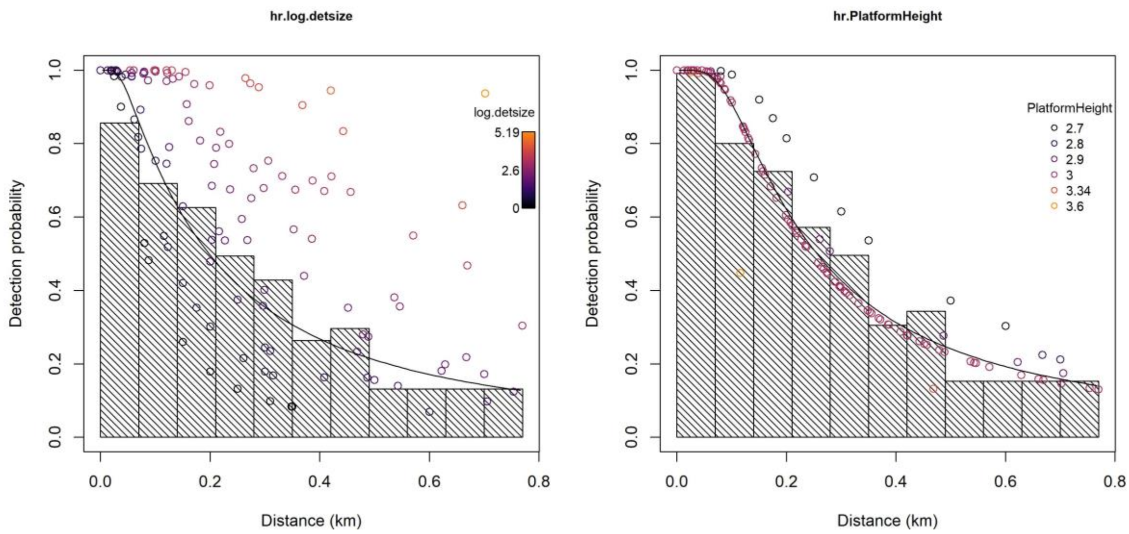


Figure C-303. Detection functions of the individual covariates.

2.48.8. Bottlenose dolphin - Risso's dolphin

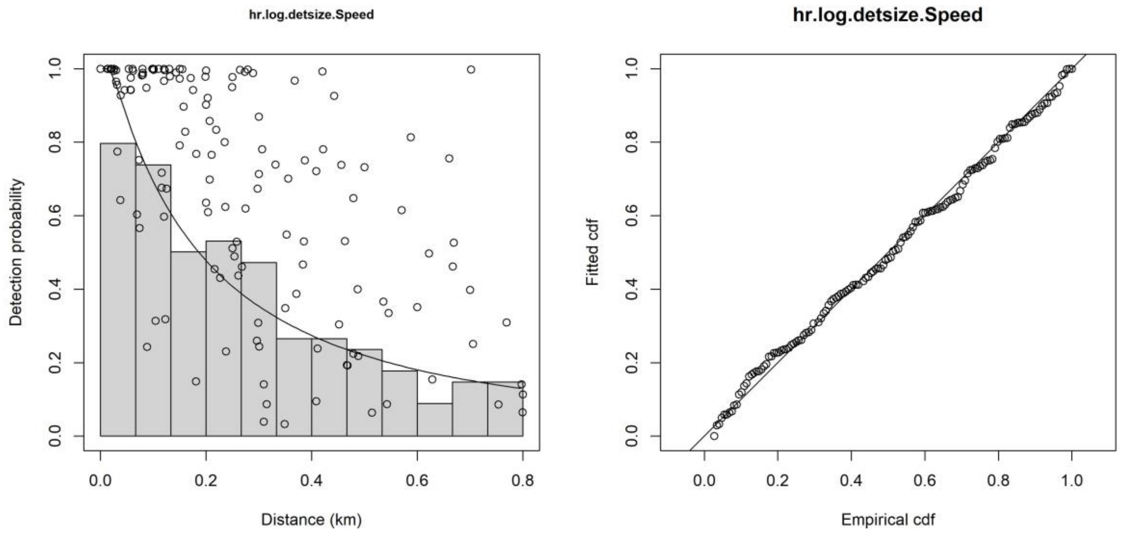


Figure C-304. Plot of the detection function (left) and QQ-Plot (right).

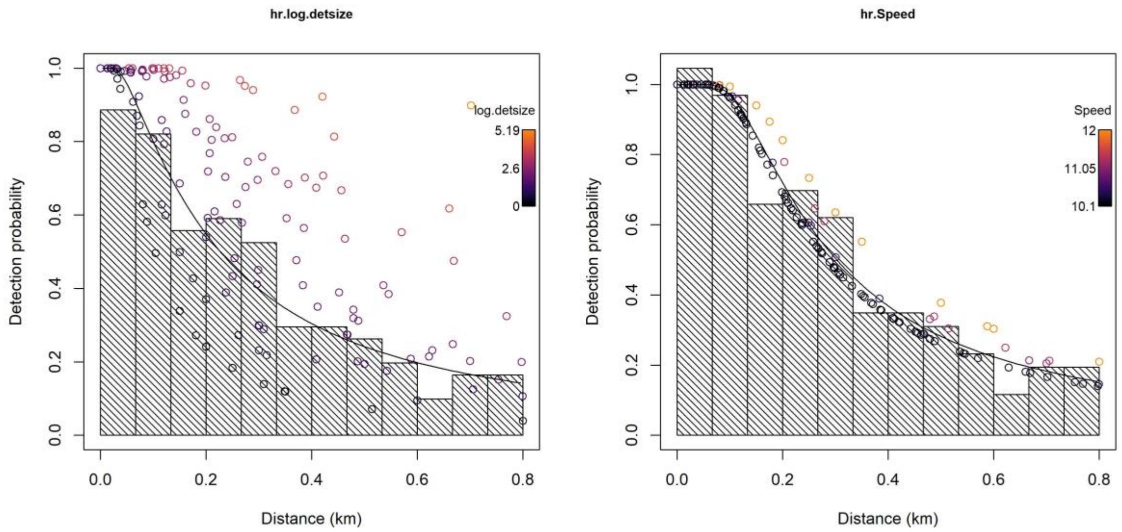


Figure C-305. Detection functions of the individual covariates.

2.49. Platform Group G6 - G7 - All

2.49.1. Striped dolphin

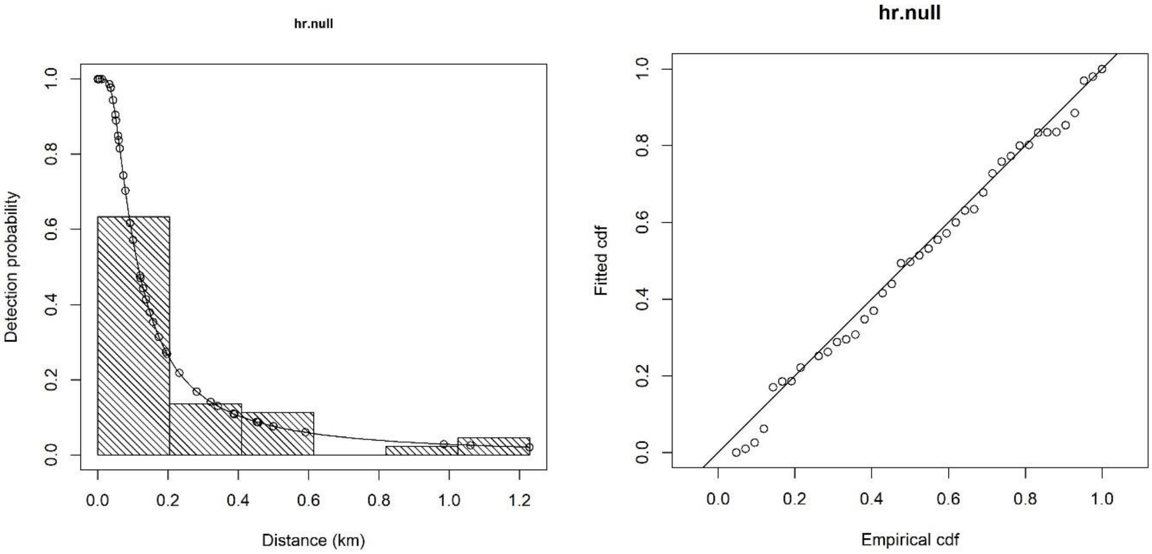


Figure C-306. Plot of the detection function (left) and QQ-Plot (right).

2.49.2. Bottlenose dolphin - Risso’s dolphin - Long-finned pilot whale - Rough - toothed dolphin - False killer whale

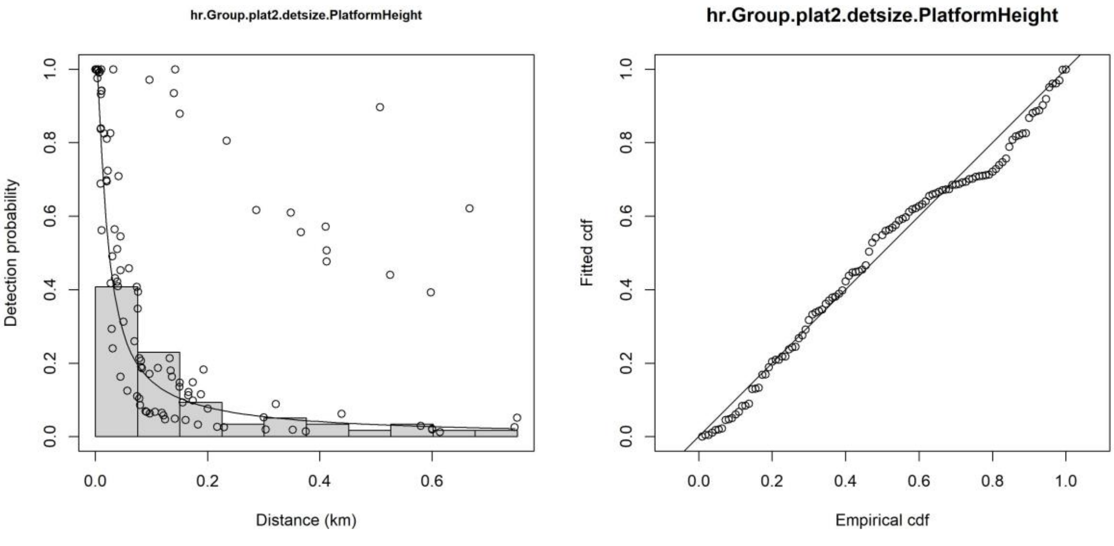


Figure C-307. Plot of the detection function (left) and QQ-Plot (right).

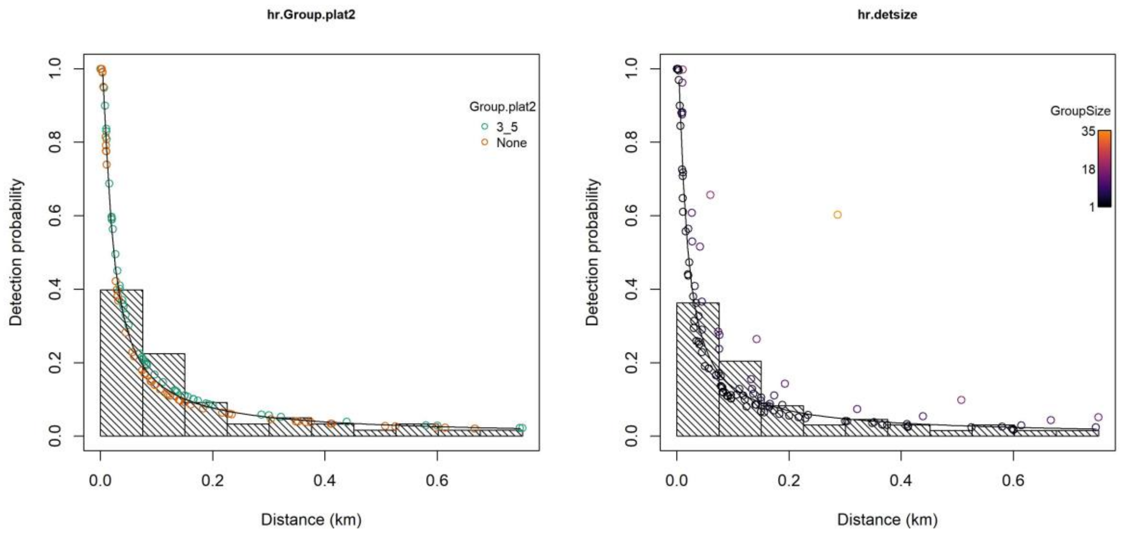


Figure C-308. Detection functions of the individual covariates.

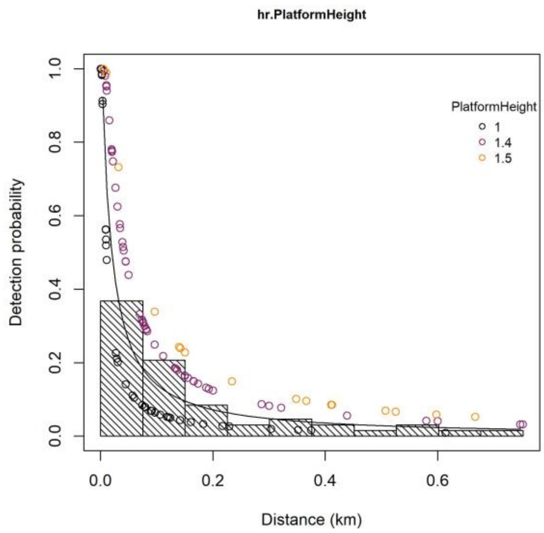


Figure C-309. Detection functions of the individual covariates.

2.50. Platform Group G6 - G7 - G8 - None

2.50.1. Bottlenose dolphin

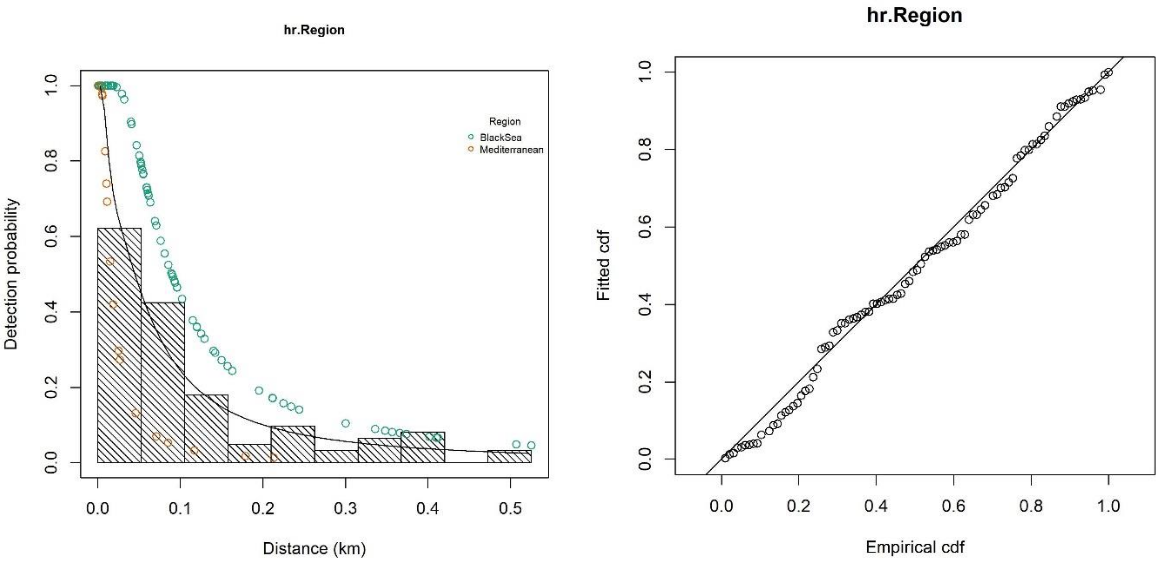


Figure C-310. Plot of the detection function (left) and QQ-Plot (right).

2.51. Platform Group G6 - G7 - None

2.51.1. Common dolphin

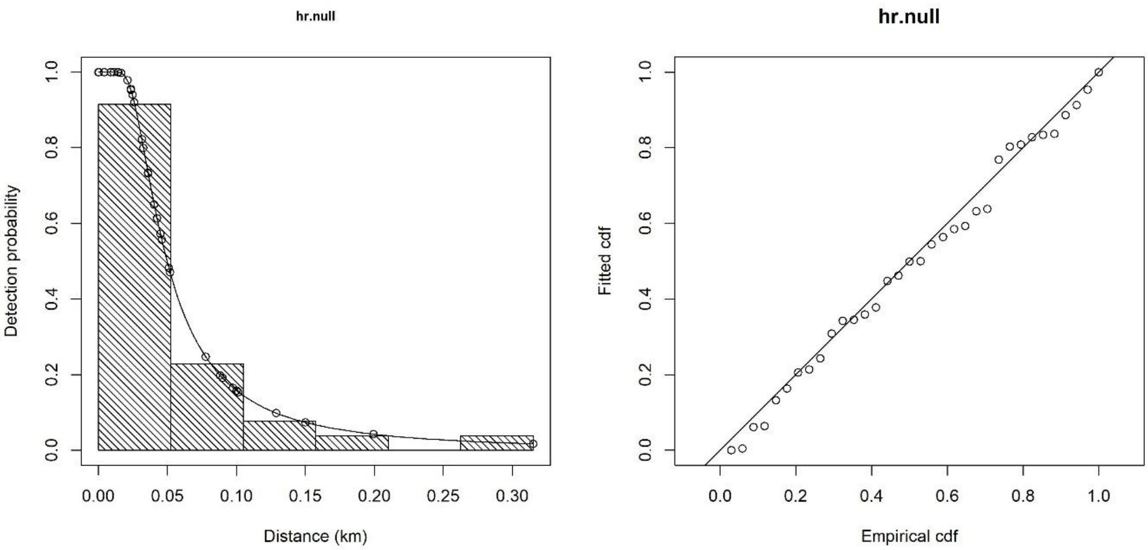


Figure C-311. Plot of the detection function (left) and QQ-Plot (right).

2.52. Platform Group G6 - None

2.52.1. Unidentified beaked whale

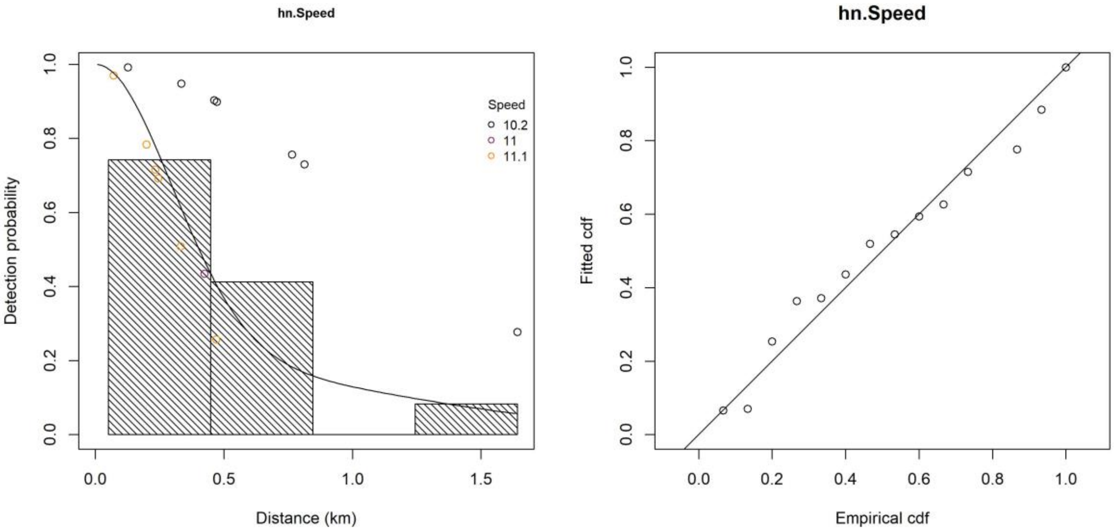


Figure C-312. Plot of the detection function (left) and QQ-Plot (right).

2.52.2. Harbor porpoise

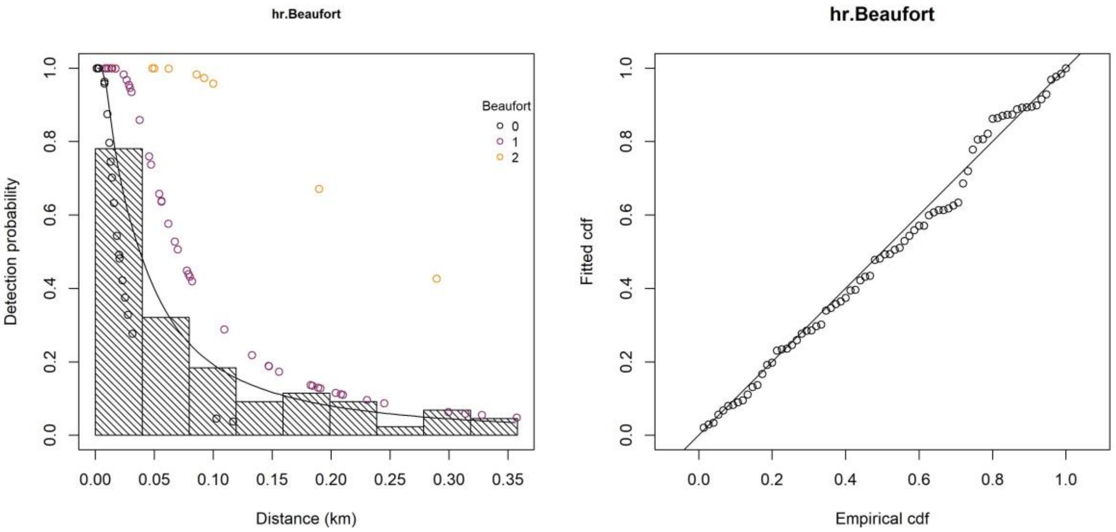


Figure C-313. Plot of the detection function (left) and QQ-Plot (right).

2.53. Platform Group G7 - 3_5

2.53.1. Harbor porpoise

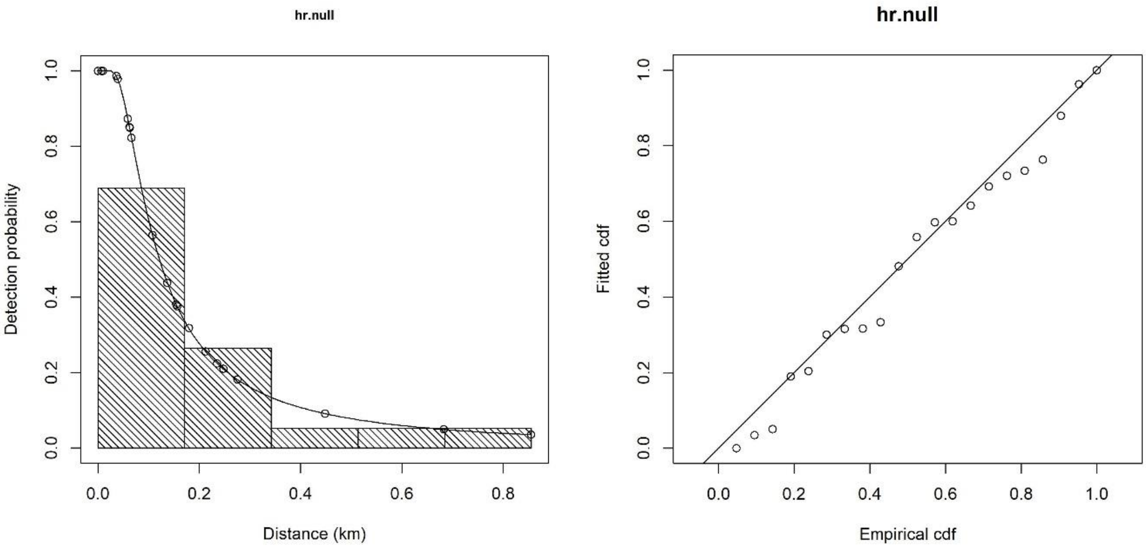


Figure C-314. Plot of the detection function (left) and QQ-Plot (right).

2.53.2. Striped dolphin - Common dolphin

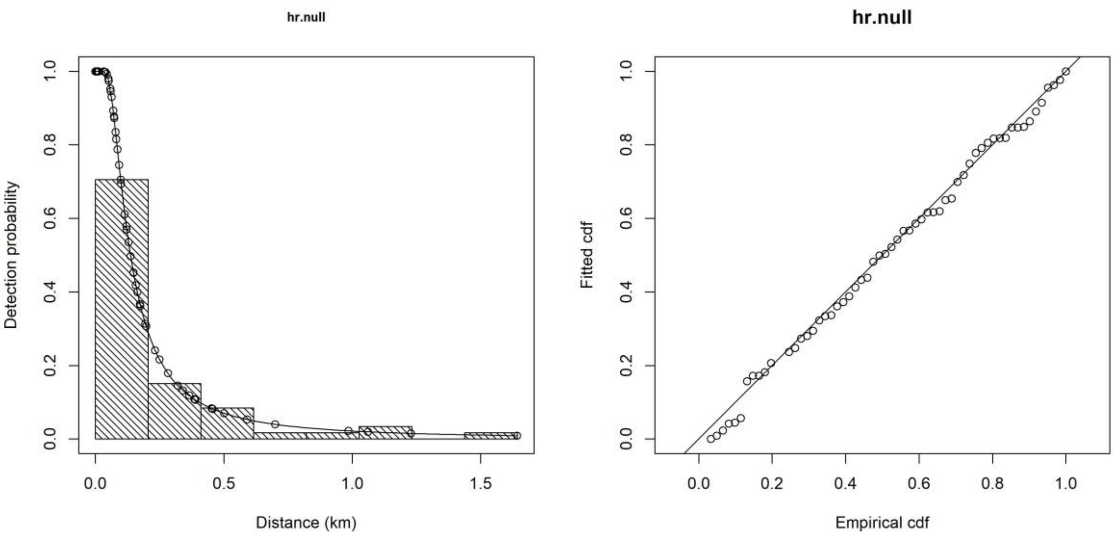


Figure C-315. Plot of the detection function (left) and QQ-Plot (right).

2.53.3. Unidentified dolphin

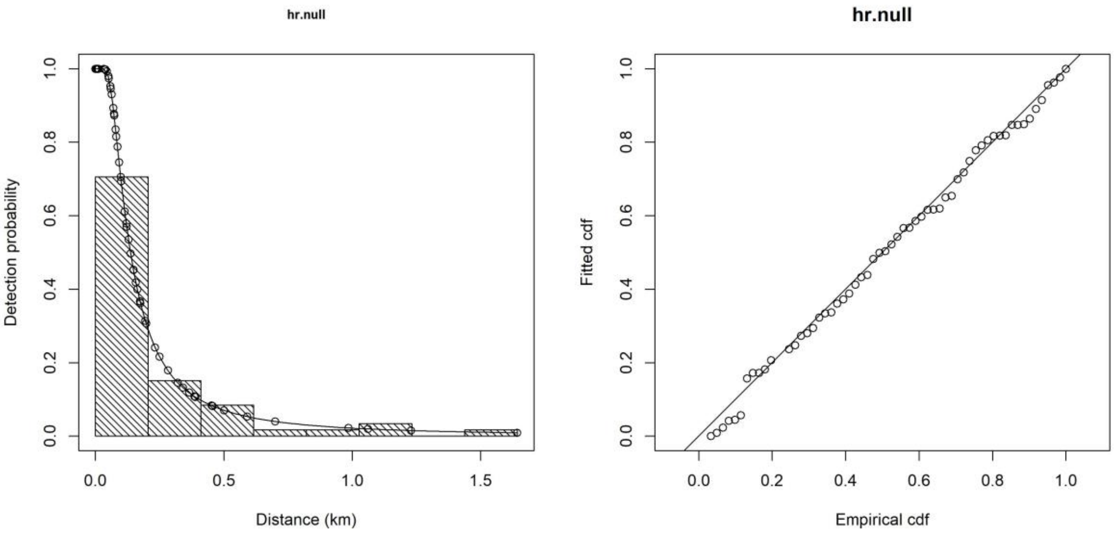


Figure C-316. Plot of the detection function (left) and QQ-Plot (right).

2.54. Platform Group G7 - All

2.54.1. Striped dolphin - Common dolphin

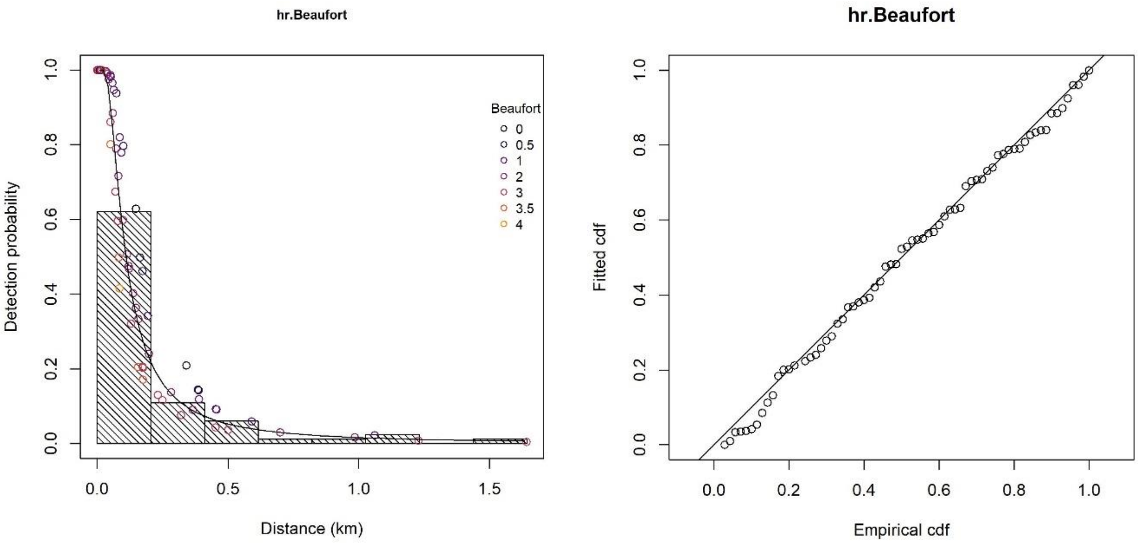


Figure C-317. Plot of the detection function (left) and QQ-Plot (right).

2.54.2. Bottlenose dolphin

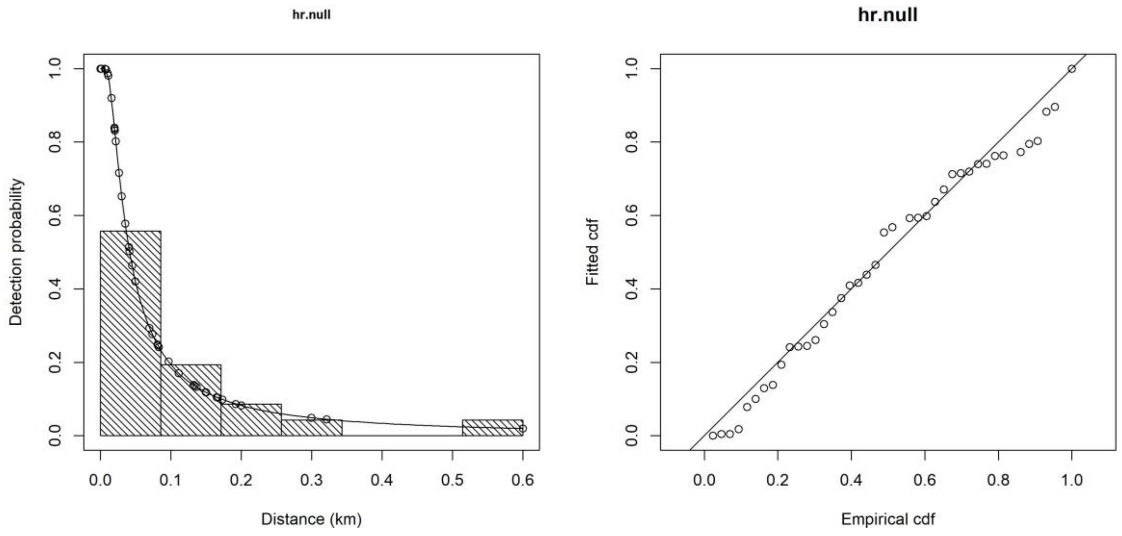


Figure C-318. Plot of the detection function (left) and QQ-Plot (right).

2.54.3. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - Rough - toothed dolphin - False killer whale

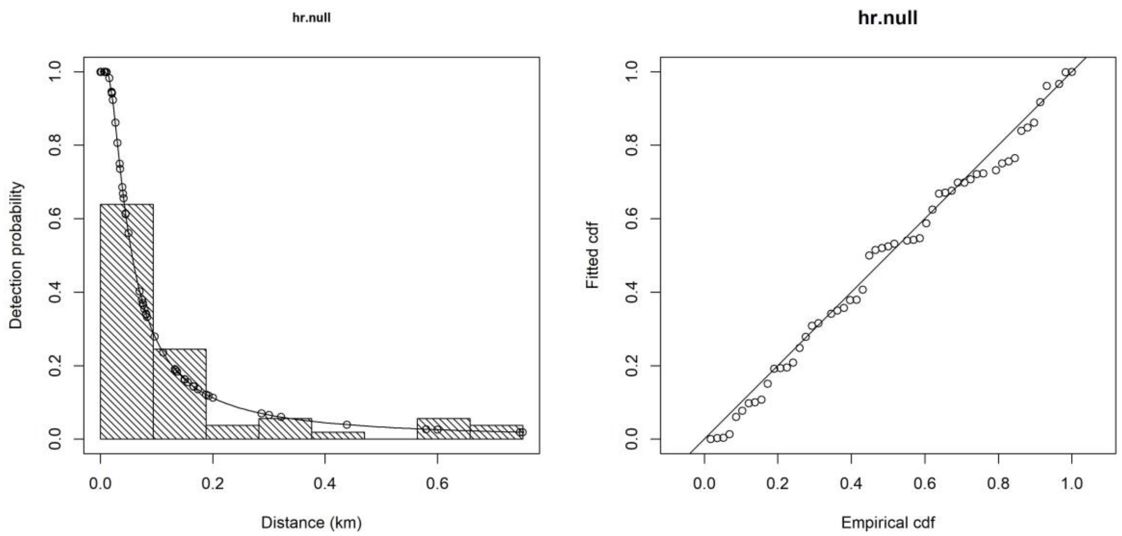


Figure C-319. Plot of the detection function (left) and QQ-Plot (right).

2.55. Platform Group G8 - G9 - None

2.55.1. Sperm whale

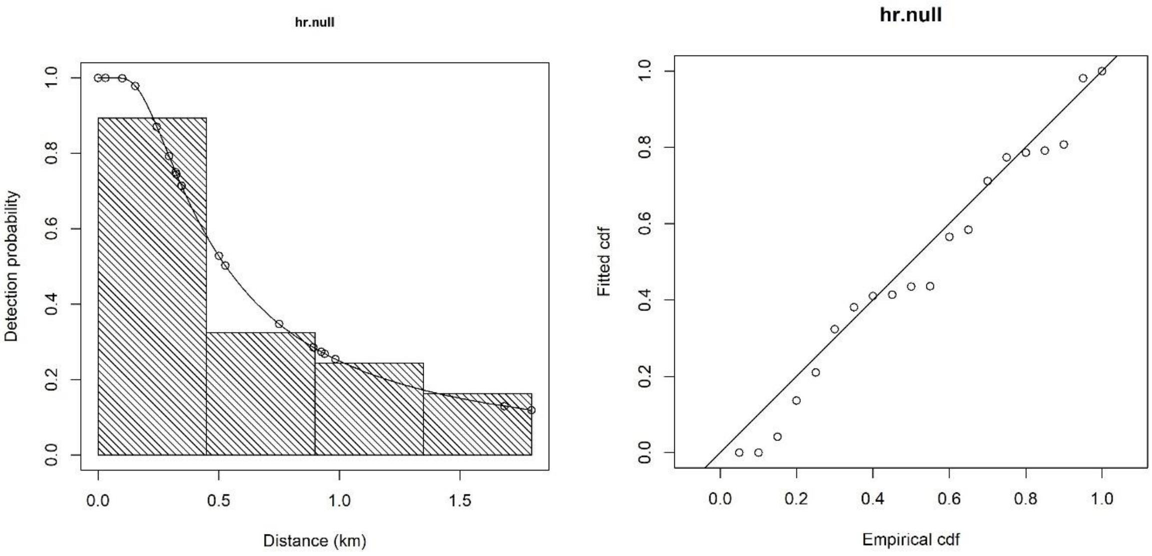


Figure C-320. Plot of the detection function (left) and QQ-Plot (right).

2.55.2. Cuvier's beaked whale

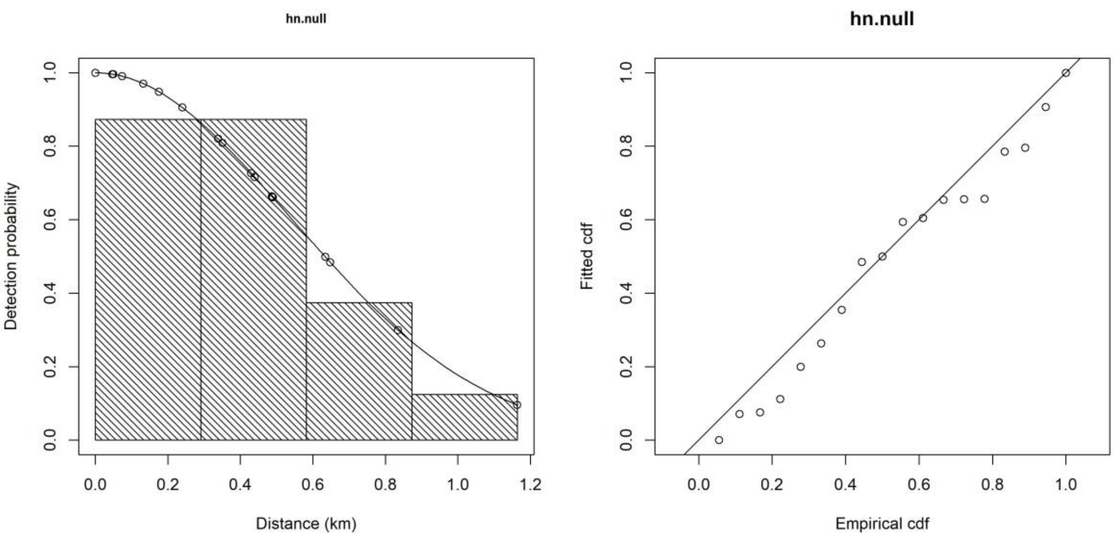


Figure C-321. Plot of the detection function (left) and QQ-Plot (right).

2.56. Platform Group G8 - None

2.56.1. Common dolphin

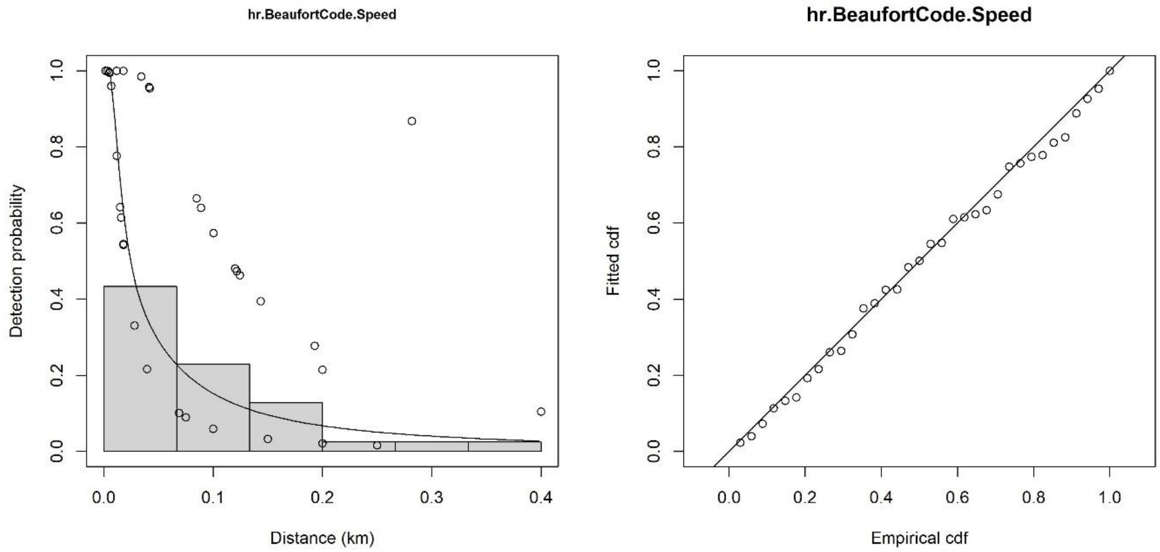


Figure C-322. Plot of the detection function (left) and QQ-Plot (right).

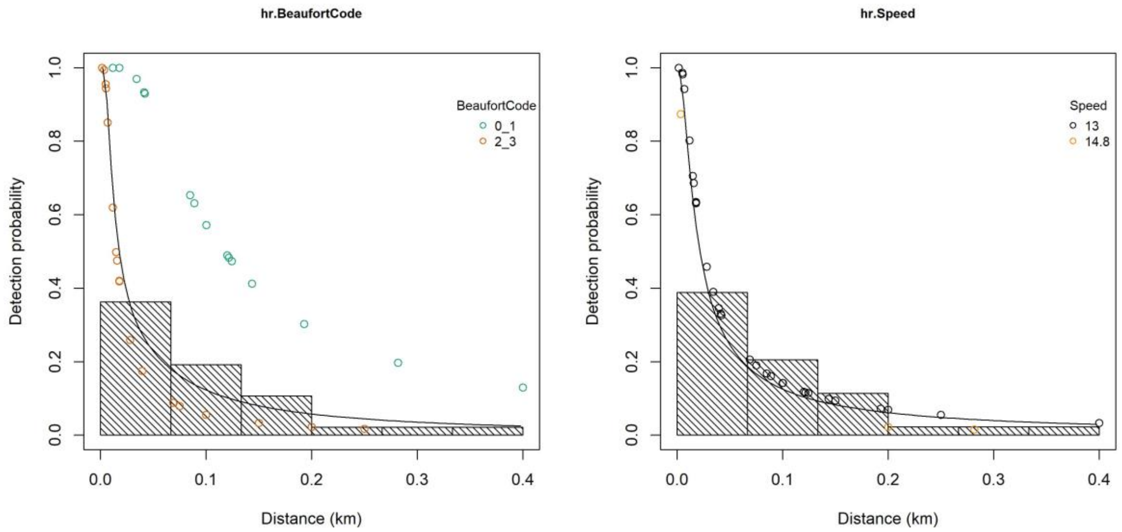


Figure C-323. Detection functions of the individual covariates.

2.56.2. Striped dolphin - Common dolphin

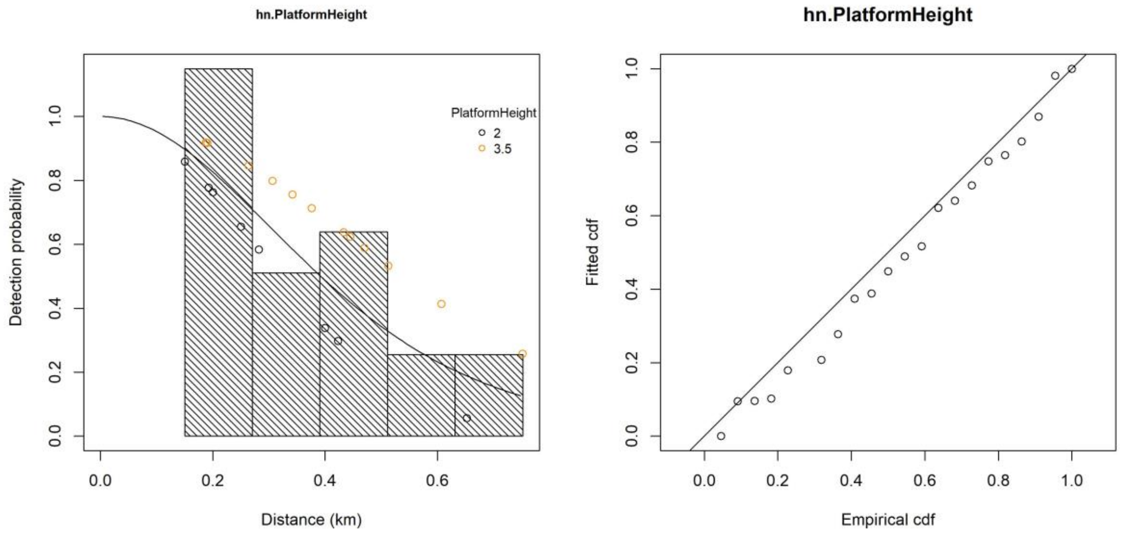


Figure C-324. Plot of the detection function (left) and QQ-Plot (right).

2.56.3. Striped dolphin - Common dolphin - Unidentified small dolphin

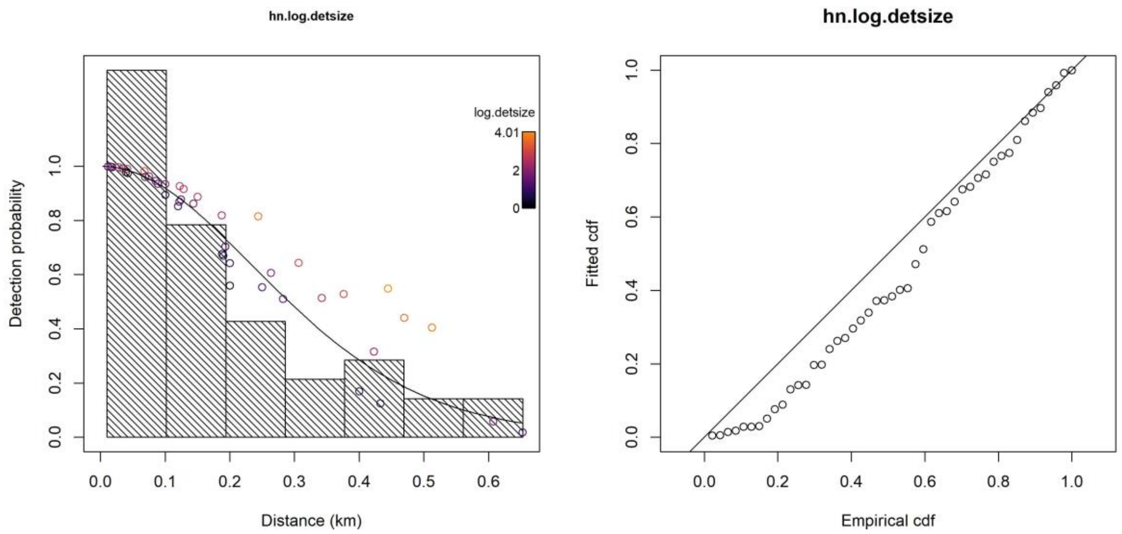


Figure C-325. Plot of the detection function (left) and QQ-Plot (right).

2.56.4. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale - False killer whale - Unidentified dolphin

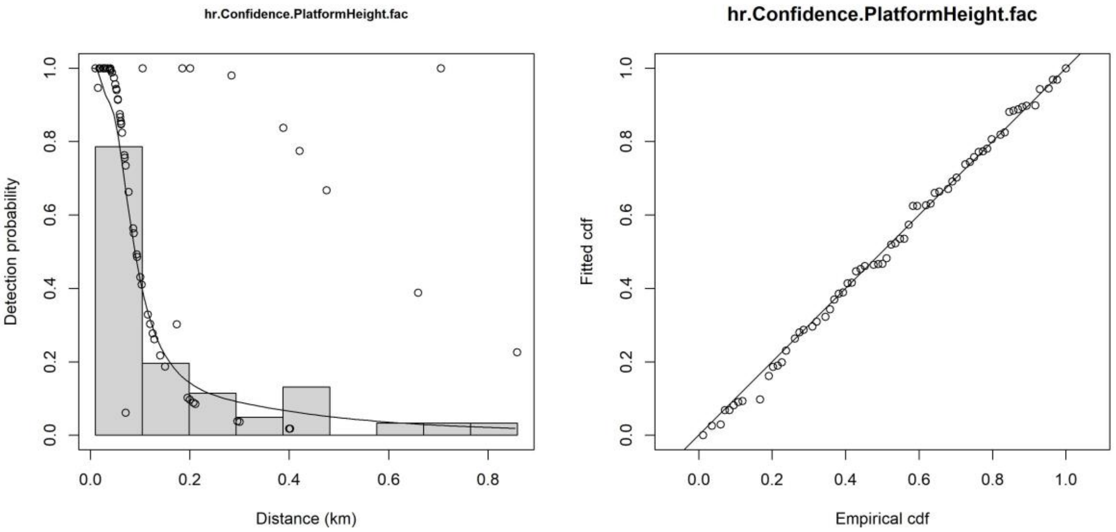


Figure C-326. Plot of the detection function (left) and QQ-Plot (right).

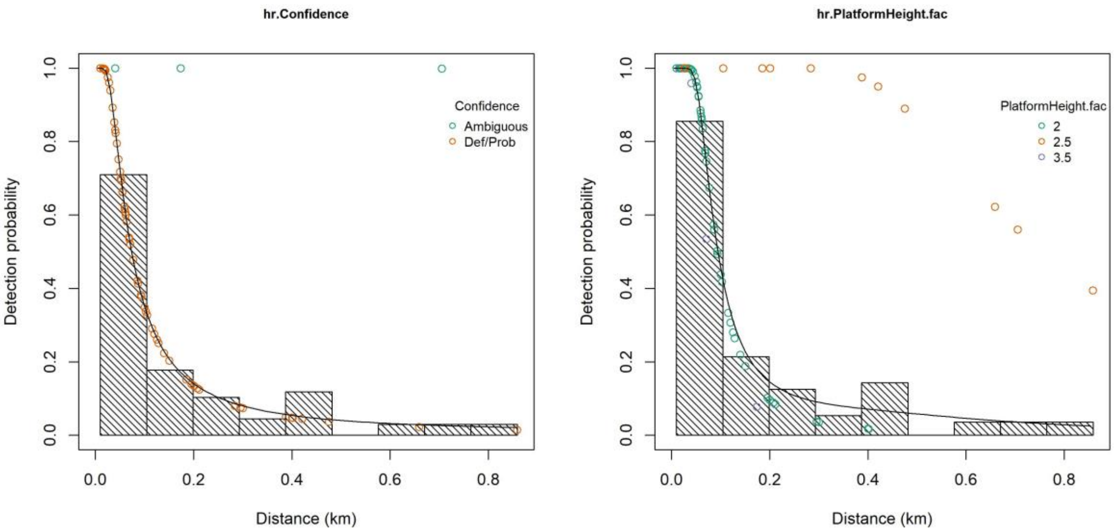


Figure C-327. Detection functions of the individual covariates.

2.56.5. Bottlenose dolphin - Risso's dolphin - False killer whale - Unidentified dolphin

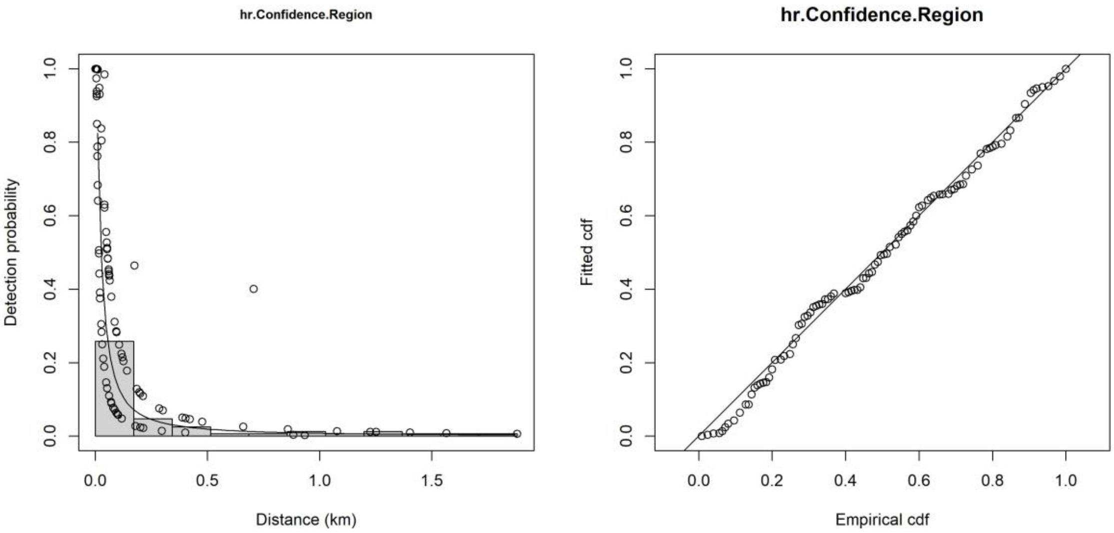


Figure C-328. Plot of the detection function (left) and QQ-Plot (right).

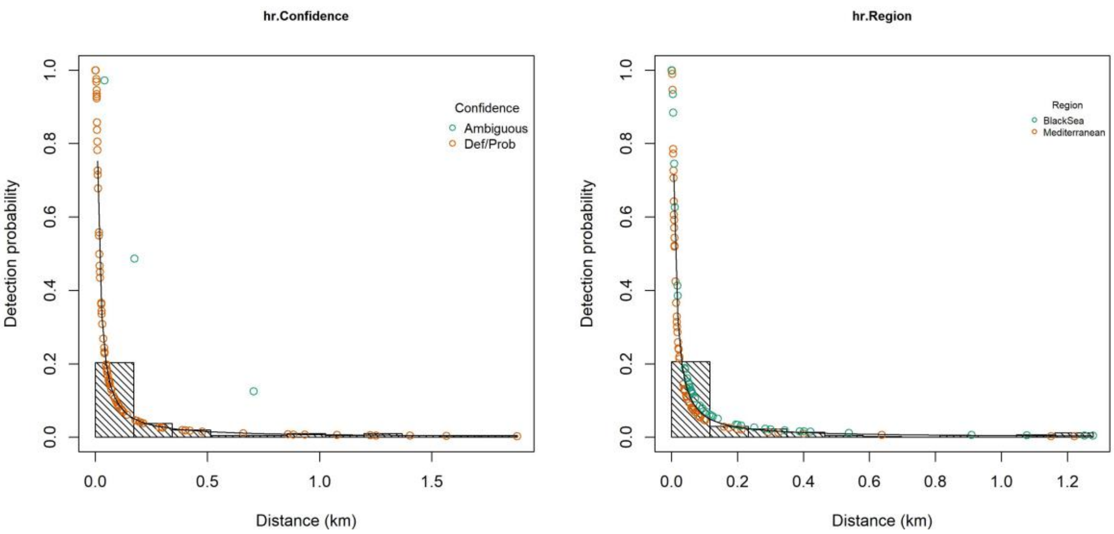


Figure C-329. Detection functions of the individual covariates.

2.56.6. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

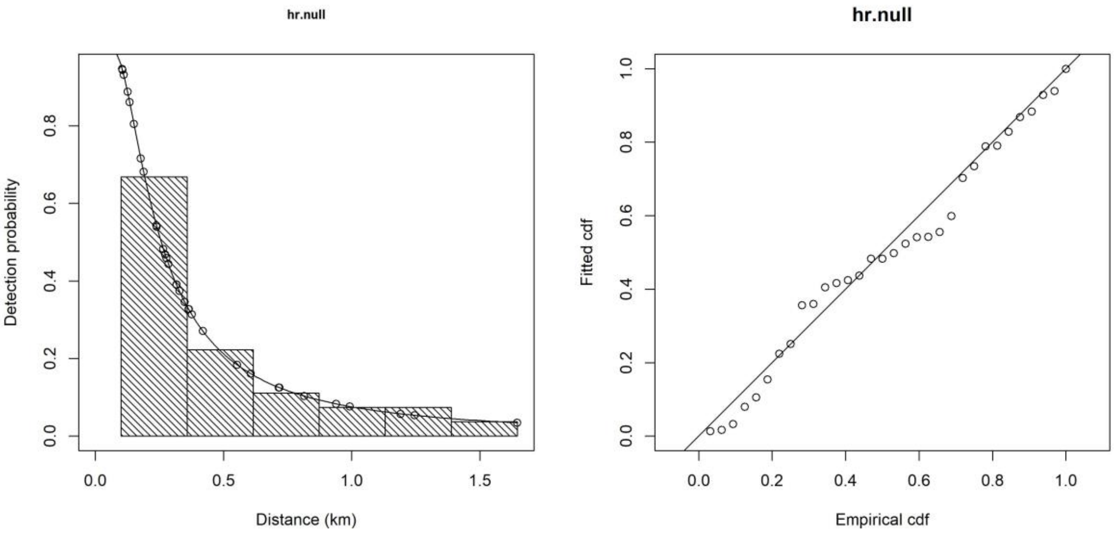


Figure C-330. Plot of the detection function (left) and QQ-Plot (right).

2.57. Platform Group G8 - None - Bulgaria

2.57.1. Harbor porpoise

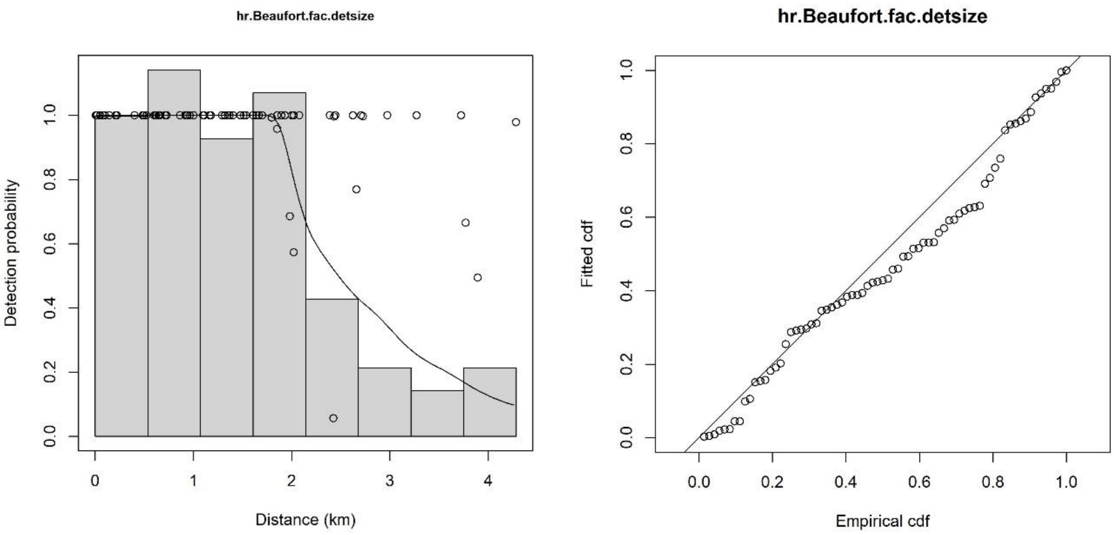


Figure C-331. Plot of the detection function (left) and QQ-Plot (right).

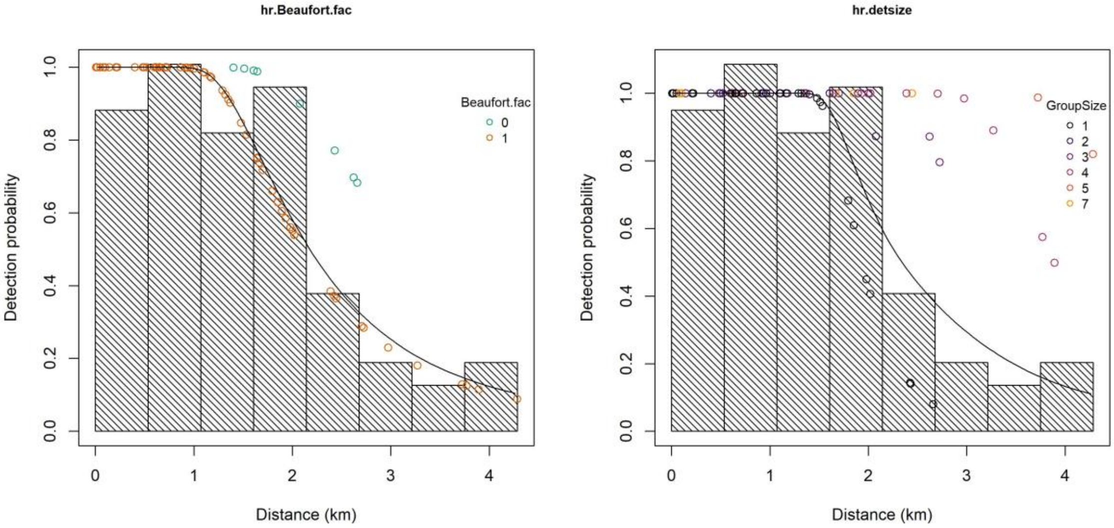


Figure C-332. Detection functions of the individual covariates.

2.58. Platform Group G8 - None - Med

2.58.1. Bottlenose dolphin - Risso's dolphin

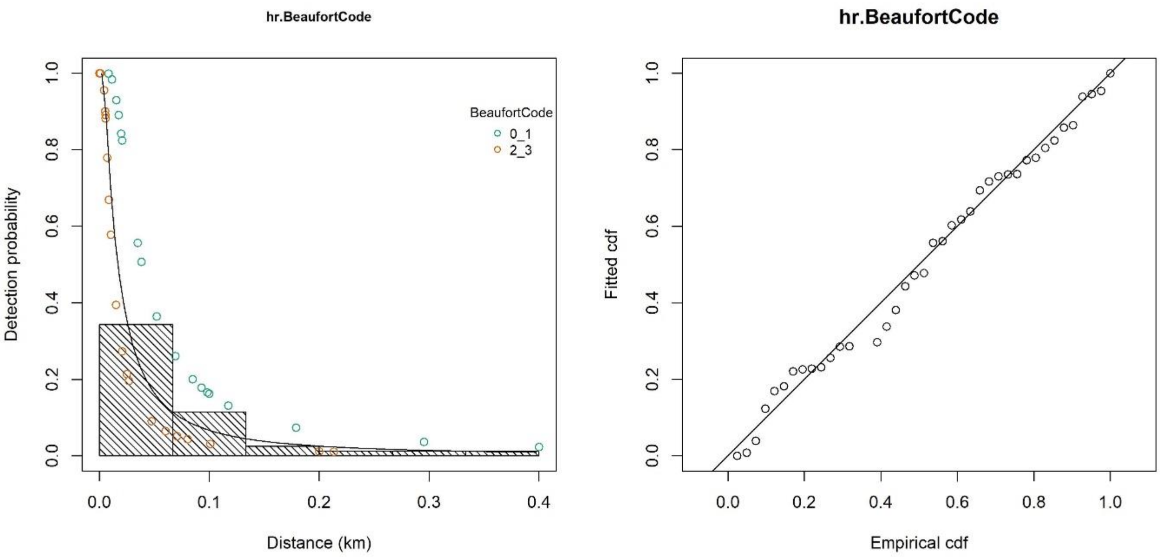


Figure C-333. Plot of the detection function (left) and QQ-Plot (right).

2.59. Platform Group G8 - None - Tudav

2.59.1. Harbor porpoise

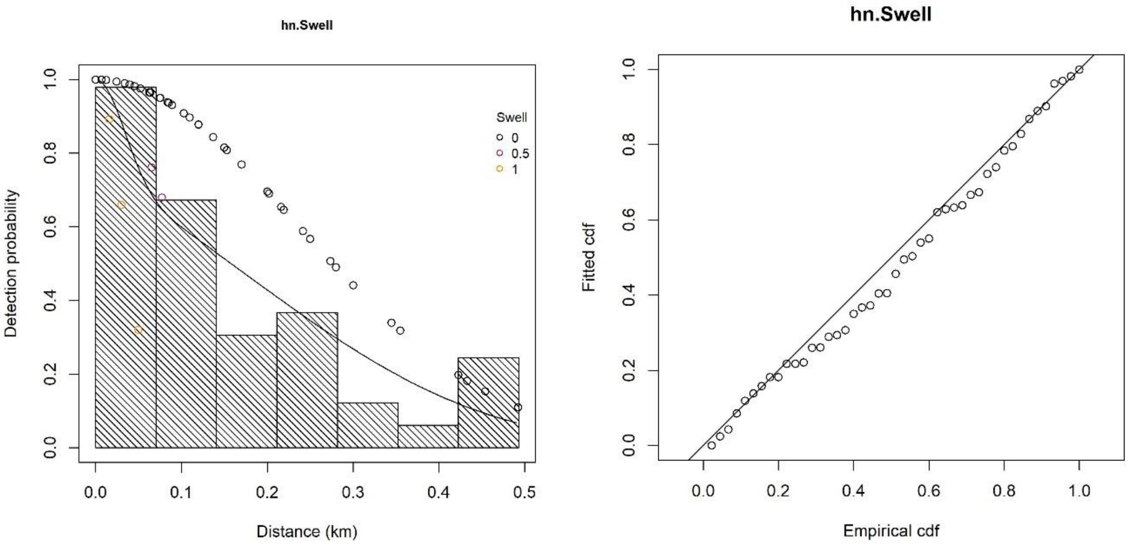


Figure C-334. Plot of the detection function (left) and QQ-Plot (right).

2.60. Platform Group G9 - 3_5

2.60.1. Bottlenose dolphin - Common dolphin - Harbor porpoise

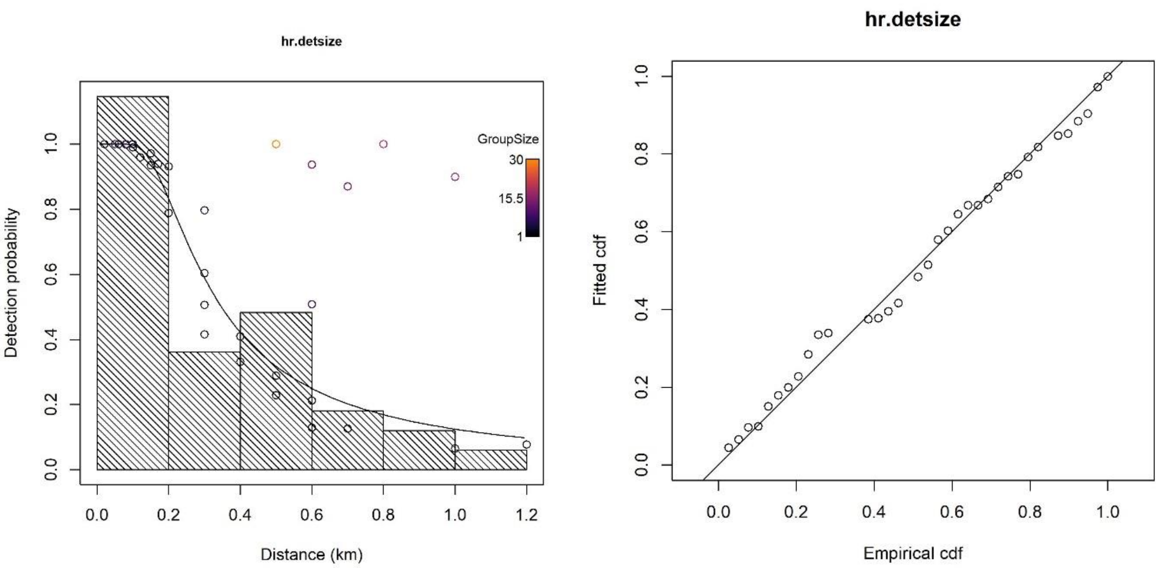


Figure C-335. Plot of the detection function (left) and QQ-Plot (right).

2.61. Platform Group G9 - 6_8

2.61.1. Common dolphin

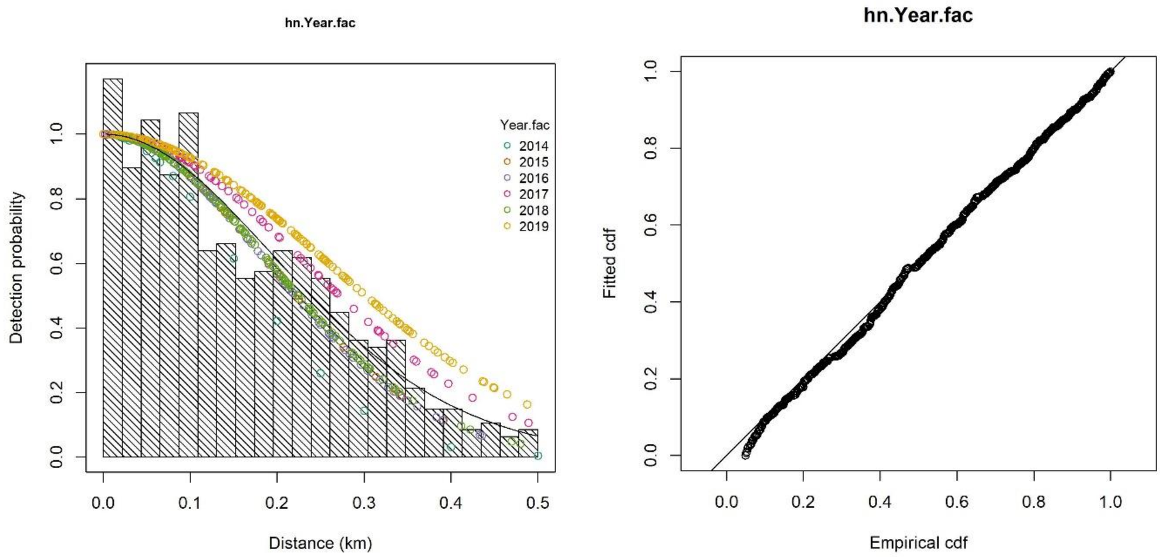


Figure C-336. Plot of the detection function (left) and QQ-Plot (right).

2.61.2. Harbor porpoise

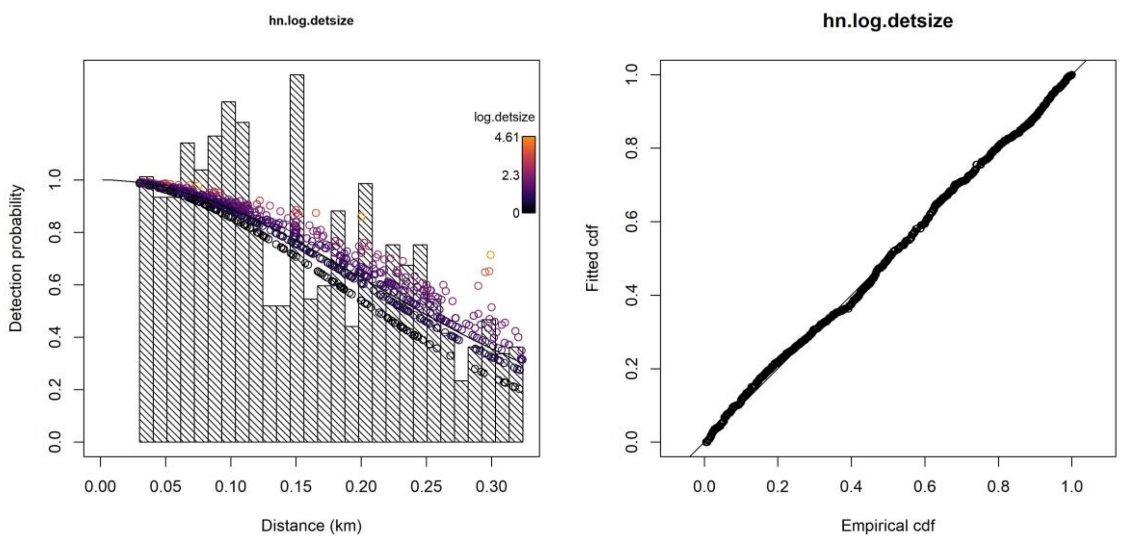


Figure C-337. Plot of the detection function (left) and QQ-Plot (right).

2.61.3. Bottlenose dolphin - Common dolphin

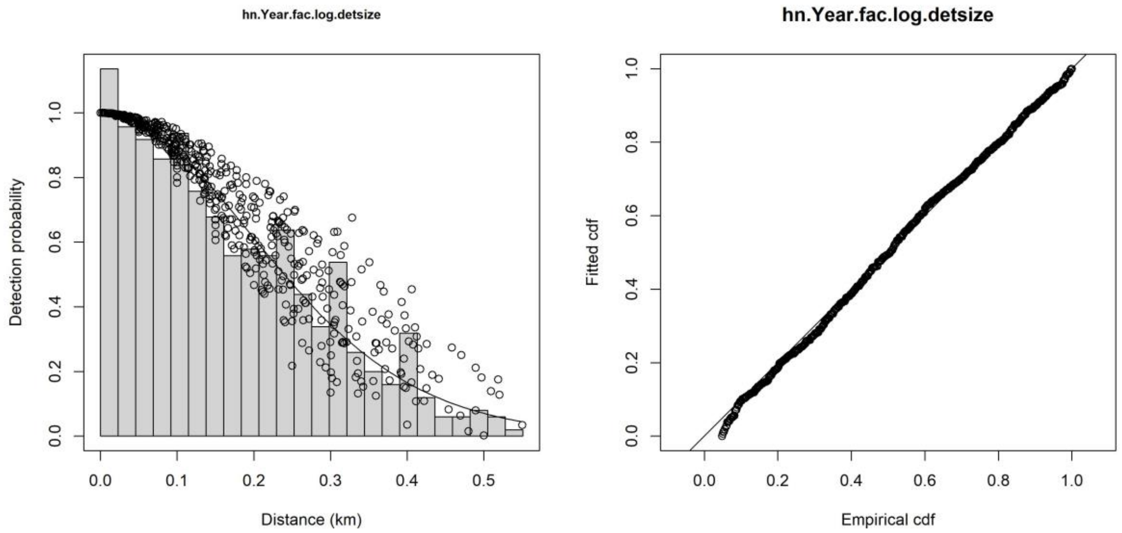


Figure C-338. Plot of the detection function (left) and QQ-Plot (right).

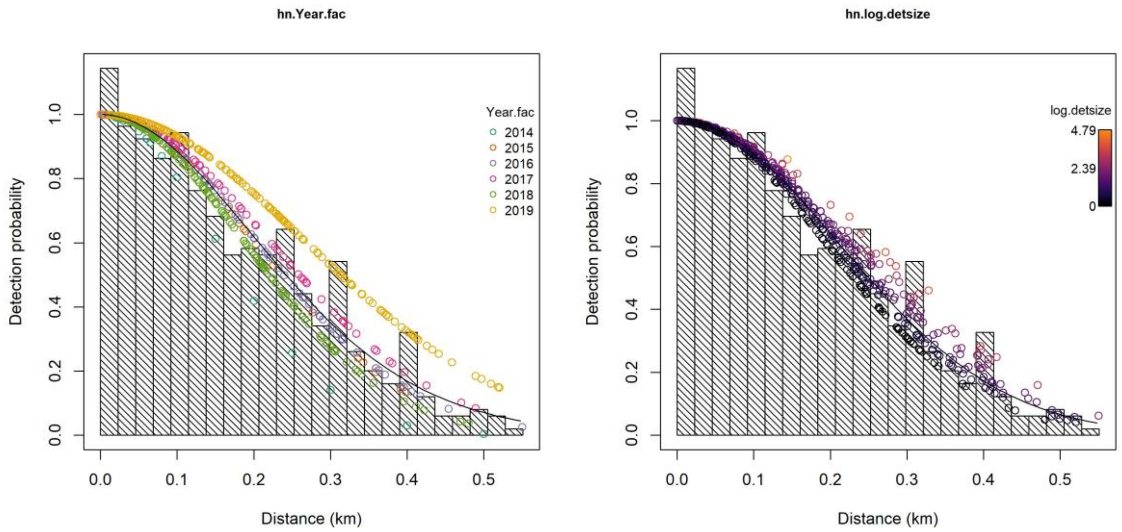


Figure C-339. Detection functions of the individual covariates.

2.62. Platform Group G9 - None

2.62.1. Common dolphin

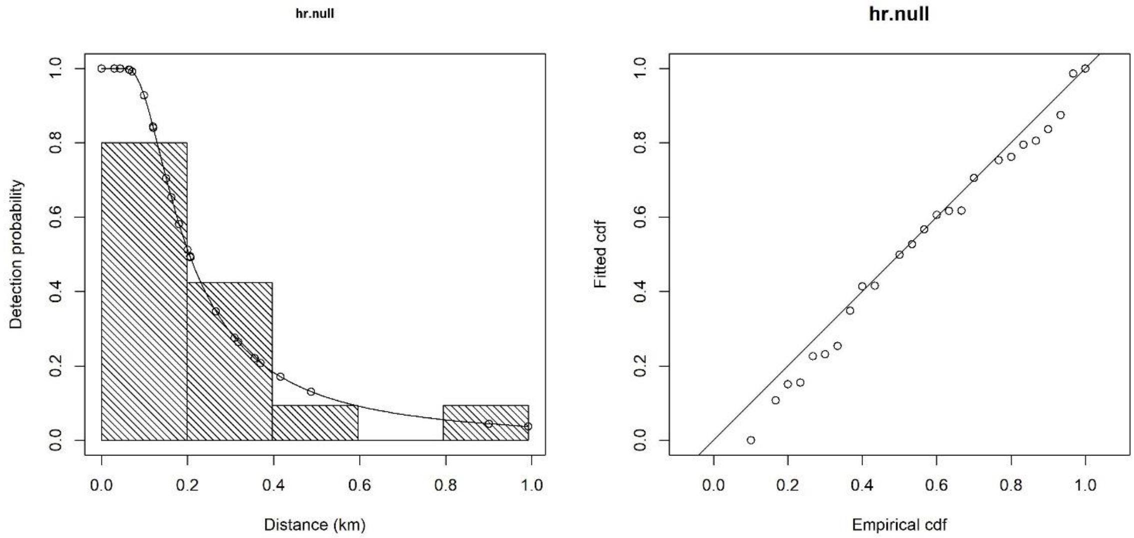


Figure C-340. Plot of the detection function (left) and QQ-Plot (right).

2.62.2. Harbor porpoise

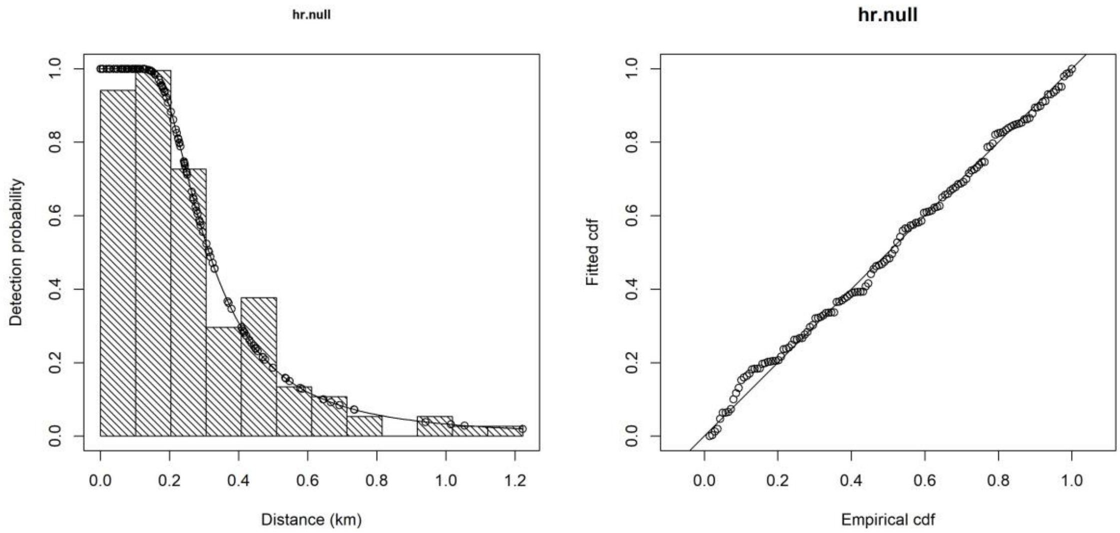


Figure C-341. Plot of the detection function (left) and QQ-Plot (right).

2.62.3. Striped dolphin - Common dolphin - Hybrid Dde-Sco - Unidentified small dolphin

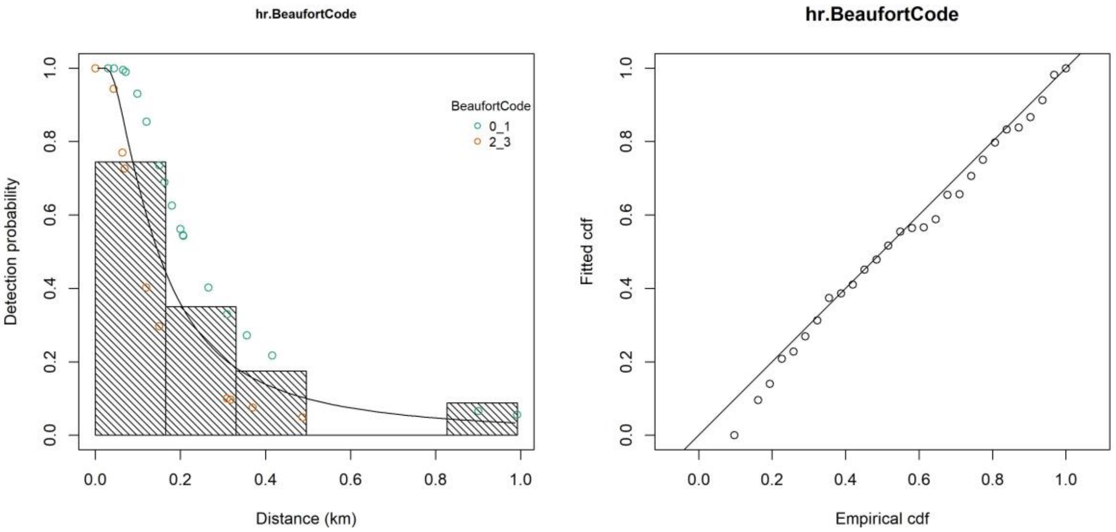


Figure C-342. Plot of the detection function (left) and QQ-Plot (right).

2.62.4. Bottlenose dolphin

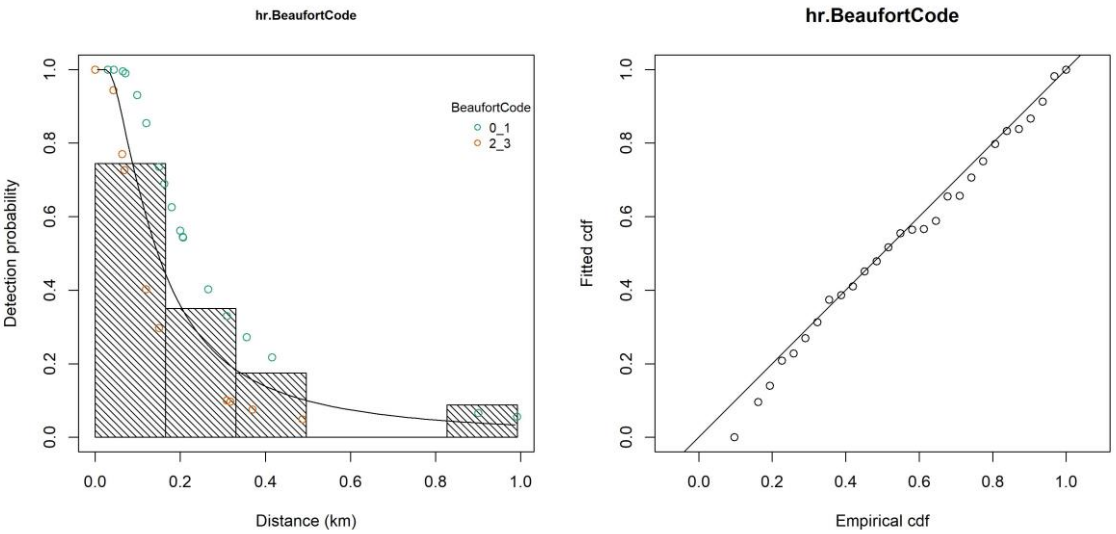


Figure C-343. Plot of the detection function (left) and QQ-Plot (right).

2.62.5. Bottlenose dolphin - Risso's dolphin - Long-finned pilot whale

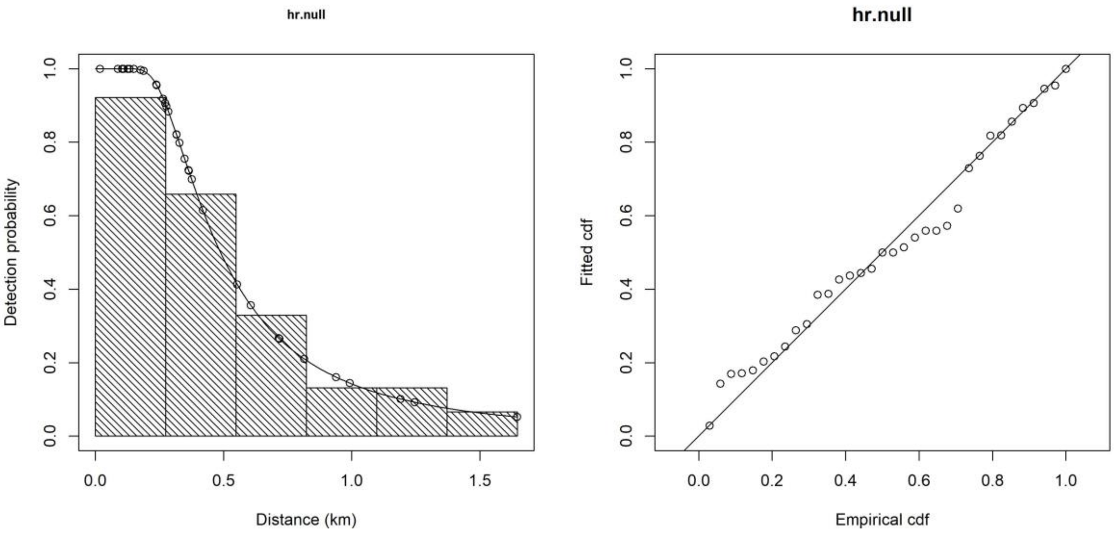


Figure C-344. Plot of the detection function (left) and QQ-Plot (right).

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D

Correction factors

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Appendix D: Correction factors

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For all the tables in this Appendix:
n = number of observations in this class;
Subjective Code = subjective value given by the observers with respect to the detectability conditions, and if not available, extracted from the Beaufort sea state (eg. good = Beaufort <=1, moderate = Beaufort 2-3);
Mean Speed = mean speed in km/h;
Mean Height = mean height of the observation platforms in meters;
Mean a = Mean availability bias for one individual;
Mean corr. a = Mean availability bias corrected by the mean group size;
Mean p = Mean perception bias;
Mean g(0) = Mean correction factor, applied to the esw of this class

1. Correction factors for the Black Sea

1.1. Bottlenose dolphin

Table D-1. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for bottlenose dolphin in the Black Sea.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Azov	good	180	150	23	4.300	0.771	0.998	0.860	0.858
	BlackSea	good	180	157.8	275	2.800	0.771	0.978	0.860	0.841
		moderate	180	183	52	3.100	0.771	0.990	0.670	0.663
	Marmara	good	180	183	1	8.000	0.771	1.000	0.860	0.860
Plane	**Total**				**351**	**4.711**	**0.771**	**0.991**	**0.793**	**0.785**
ship	Azov	good	12	2.7	18	2.200	1.000	1.000	0.856	0.856
	BlackSea	good	14	3.5	589	4.400	0.979	1.000	0.856	0.856
		moderate	15	2.8	10	3.800	0.972	1.000	0.856	0.856
	Marmara	good	13	1.5	15	4.100	0.974	1.000	0.856	0.856
		moderate	14	1.5	2	4.500	0.943	1.000	0.856	0.856
Ship	**Total**				**634**	**7.554**	**0.968**	**0.999**	**0.860**	**0.860**

1.2. Common dolphin

Table D-2. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for common dolphin in the Black Sea.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Azov	good	180	150	0	3.600	0.667	0.982	0.780	0.766
	BlackSea	good	180	157.8	775	3.600	0.667	0.965	0.780	0.753
		moderate	180	183	72	4.200	0.667	0.964	0.560	0.540
	Marmara	good	180	183	0	4.000	0.667	0.988	0.780	0.771
Plane	**Total**				**847**	**29.980**	**0.667**	**0.994**	**0.902**	**0.898**
ship	Azov	good	12	2.7	0	3.600	0.998	1.000	0.856	0.856
	BlackSea	good	14	3.5	1,421	3.800	0.918	0.995	0.856	0.852
		moderate	15	2.8	15	3.400	0.909	1.000	0.856	0.855
	Marmara	good	13	2.2	5	4.000	0.923	1.000	0.856	0.856
		moderate	14	1.5	1	4.000	0.827	0.999	0.856	0.855
Ship	**Total**				**1,442**	**28.408**	**0.923**	**0.999**	**0.919**	**0.918**

1.3. Harbor porpoise

Table D-3. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for harbor porpoise in the Black Sea.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Azov	good	180	150	107	1.500	0.434	0.591	0.520	0.307
	BlackSea	good	180	157.8	868	2.000	0.434	0.662	0.520	0.344
		moderate	180	183	51	2.200	0.434	0.699	0.520	0.364
	Marmara	good	180	183	0	3.500	0.434	0.867	0.520	0.451
Plane	**Total**				**1,026**	**2.120**	**0.434**	**0.675**	**0.520**	**0.351**
ship	Azov	good	12	2.7	5	1.300	0.994	0.999	0.350	0.350
	BlackSea	good	14	3.6	2,520	3.000	0.817	0.871	0.368	0.316
		moderate	15	2.8	30	4.500	0.984	1.000	0.350	0.350
	Marmara	good	13	2.2	9	3.500	0.786	0.885	0.350	0.310
		moderate	14	1.5	2	3.500	0.949	1.000	0.350	0.350
Ship	**Total**				**2,566**	**2.864**	**0.916**	**0.945**	**0.355**	**0.334**

2. Correction factors for the Mediterranean

2.1. Fin whale

Table D-4. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for fin whale in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	1	1.000	0.284	0.284	0.990	0.281
		moderate	180	200	0	1.000	0.284	0.284	0.990	0.281
	Aegean	good	180	210.6	0	1.700	0.285	0.429	0.990	0.424
		moderate	180	229	0	1.700	0.284	0.428	0.990	0.424
	Ionian	good	180	211.8	2	1.300	0.284	0.352	0.990	0.348
		moderate	180	229	1	1.200	0.284	0.338	0.990	0.335
	Levantine	good	180	206	0	1.700	0.284	0.428	0.990	0.424
		moderate	180	229	0	1.700	0.284	0.428	0.990	0.424
	WMed	good	180	213.7	207	1.500	0.284	0.392	0.990	0.388
		moderate	180	225.7	6	1.400	0.284	0.363	0.990	0.360
Plane	**Total**				**217**	**1.422**	**0.284**	**0.372**	**0.990**	**0.369**
ship	Adriatic	good	19	4.7	1	1.000	0.648	0.408	0.705	0.288
		moderate	16	0.7	0	1.000	0.931	0.476	0.720	0.342
	Aegean	good	13	3.2	0	1.700	0.755	0.800	0.720	0.576
		moderate	14	1.4	0	1.700	0.612	0.713	0.720	0.513
	Ionian	good	16	3.7	0	1.400	0.567	0.636	0.715	0.455
		moderate	14	3	0	1.400	0.542	0.552	0.720	0.398
	Levantine	good	14	2.7	0	1.700	0.752	0.807	0.721	0.582
		moderate	14	2.4	0	1.700	0.662	0.622	0.721	0.448
	WMed	good	15	6.1	1,835	1.600	0.828	0.858	0.700	0.599
		moderate	18	8	107	1.600	0.718	0.794	0.679	0.532
Ship	**Total**				**1,943**	**1.589**		**0.772**	**0.705**	**0.542**

2.2. Sperm whale

Table D-5. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for sperm whale in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	0	1.900	0.170	0.280	0.900	0.252
		moderate	180	200	0	1.900	0.170	0.188	0.900	0.169
	Aegean	good	180	210.6	1	4.000	0.170	0.511	0.900	0.460
		moderate	180	229	0	3.300	0.170	0.456	0.900	0.410
	Ionian	good	180	211.8	6	4.300	0.170	0.514	0.900	0.463
		moderate	180	229	0	3.800	0.170	0.464	0.900	0.418
	Levantine	good	180	206	2	3.400	0.170	0.456	0.900	0.410
		moderate	180	229	0	4.200	0.170	0.542	0.900	0.488
	WMed	good	180	212.9	58	1.600	0.170	0.247	0.900	0.222
		moderate	180	221.3	17	1.200	0.170	0.196	0.900	0.177
Plane	**Total**				**84**	**2.504**	**0.170**	**0.339**	**0.900**	**0.305**
ship	Adriatic	good	19	4.7	0	1.900	0.344	0.510	0.640	0.335
		moderate	16	0.7	0	1.900	0.218	0.439	0.690	0.303
	Aegean	good	13	3.2	0	3.100	0.288	0.638	0.690	0.626
		moderate	15	2.1	0	2.500	0.180	0.528	0.690	0.519
	Ionian	good	16	3.7	10	6.000	0.285	0.736	0.674	0.686
		moderate	14	2.1	3	5.600	0.204	0.682	0.690	0.681
	Levantine	good	14	2.3	8	3.700	0.270	0.630	0.695	0.570
		moderate	14	1.8	1	3.500	0.223	0.544	0.690	0.442
	WMed	good	15	6.2	548	1.600	0.349	0.452	0.666	0.307
		moderate	17	8.9	103	1.500	0.353	0.458	0.641	0.303
Ship	**Total**				**673**	**2.573**	**0.314**	**0.526**	**0.671**	**0.416**

2.3. Risso's dolphin

Table D-6. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for Risso's dolphin in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	6	4.900	0.648	0.990	0.860	0.852
		moderate	180	200	12	4.200	0.649	0.988	0.670	0.662
	Aegean	good	180	210.6	4	11.200	0.648	0.991	0.887	0.879
		moderate	180	229	0	26.000	0.648	1.000	0.994	0.994
	Ionian	good	180	211.8	23	8.300	0.648	0.971	0.877	0.851
		moderate	180	229	12	6.900	0.648	0.995	0.670	0.667
	Levantine	good	180	206	1	5.200	0.648	0.968	0.860	0.832
		moderate	180	229	0	6.200	0.648	0.998	0.670	0.669
	WMed	good	180	208.1	136	6.700	0.648	0.987	0.860	0.849
		moderate	180	220.7	22	6.600	0.648	0.985	0.670	0.660
Plane	**Total**				**216**	**7.124**	**0.648**	**0.985**	**0.799**	**0.787**
ship	Adriatic	good	19	4.7	0	4.600	0.701	1.000	0.690	0.690
		moderate	17	0.5	0	4.600	0.651	1.000	0.690	0.690
	Aegean	good	13	3	0	10.100	0.770	1.000	0.706	0.706
		moderate	17	1.4	1	10.000	0.796	1.000	0.690	0.690
	Ionian	good	16	3.8	0	6.100	0.721	0.990	0.690	0.683
		moderate	15	0.9	0	6.600	0.691	0.999	0.690	0.689
	Levantine	good	14	2.7	10	6.700	0.763	0.992	0.702	0.696
		moderate	16	2.8	0	6.000	0.718	0.980	0.690	0.676
	WMed	good	14	6.2	226	8.900	0.860	0.988	0.701	0.693
		moderate	13	6.2	15	9.900	0.794	1.000	0.704	0.704
Ship	**Total**				**252**	**8.277**	**0.809**	**0.991**	**0.700**	**0.694**

2.4. Long-finned pilot whale

Table D-7. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for long-finned pilot whale in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	0	27.900	0.578	1.000	0.980	0.980
		moderate	180	200	0	27.900	0.578	0.971	0.712	0.691
	Aegean	good	180	210.6	0	27.900	0.578	1.000	0.980	0.980
		moderate	180	229	0	27.900	0.578	1.000	0.712	0.712
	Ionian	good	180	211.8	5	9.900	0.578	1.000	0.980	0.980
		moderate	180	229	1	9.900	0.578	1.000	0.712	0.712
	Levantine	good	180	206	0	27.900	0.578	1.000	0.980	0.980
		moderate	180	229	0	27.900	0.578	1.000	0.712	0.712
	WMed	good	180	208.1	45	16.000	0.578	0.963	0.980	0.944
		moderate	180	213.4	5	9.600	0.578	0.914	0.712	0.650
Plane	**Total**				**56**	**17.737**	**0.578**	**0.973**	**0.916**	**0.893**
ship	Adriatic	good	19	4.7	0	27.900	0.704	1.000	0.980	0.980
		moderate	16	0.7	0	27.900	0.767	1.000	0.980	0.980
	Aegean	good	13	3.2	0	27.900	0.790	1.000	0.980	0.980
		moderate	14	1.4	0	27.900	0.747	1.000	0.980	0.980
	Ionian	good	16	3.8	0	9.900	0.714	1.000	0.980	0.980
		moderate	14	1.1	0	9.900	0.722	1.000	0.980	0.980
	Levantine	good	14	2.7	0	27.900	0.791	1.000	0.980	0.980
		moderate	13	1.3	0	27.900	0.891	1.000	0.980	0.980
	WMed	good	15	5.6	806	23.800	0.862	0.996	0.980	0.976
		moderate	14	6.8	115	23.100	0.794	1.000	0.980	0.980
Ship	**Total**				**921**	**23.158**	**0.818**	**0.998**	**0.980**	**0.978**

2.5. Cuvier's beaked whales

Table D-8. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for Cuvier's beaked whales in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	206	1	1.000	0.072	0.072	0.898	0.065
	Aegean	good	180	210.6	2	2.100	0.072	0.143	0.898	0.128
		moderate	180	229	0	2.200	0.072	0.139	0.898	0.125
	Ionian	good	180	211.8	4	2.400	0.072	0.159	0.898	0.142
		moderate	180	229	0	2.400	0.072	0.139	0.898	0.125
	Levantine	good	180	206	2	3.000	0.072	0.194	0.898	0.175
		moderate	180	229	0	2.000	0.072	0.139	0.898	0.125
	WMed	good	180	207.2	11	2.300	0.072	0.159	0.898	0.143
		moderate	180	211.1	0	2.300	0.072	0.142	0.898	0.127
Plane	**Total**				**20**	**2.296**	**0.072**	**0.153**	**0.898**	**0.137**
ship	Adriatic	good	19	4.7	0	1.000	0.263	0.232	0.898	0.208
		moderate	16	0.7	0	1.000	0.083	0.086	0.898	0.077
	Aegean	good	13	3	0	2.200	0.181	0.351	0.898	0.315
		moderate	15	2.1	0	2.200	0.086	0.230	0.898	0.206
	Ionian	good	16	3.7	14	2.300	0.229	0.364	0.898	0.327
		moderate	14	2.2	2	2.300	0.099	0.222	0.898	0.199
	Levantine	good	14	2.2	2	2.100	0.231	0.405	0.898	0.364
		moderate	14	1.8	0	2.100	0.103	0.195	0.898	0.175
	WMed	good	15	6.2	273	2.300	0.266	0.467	0.898	0.419
		moderate	12	5.9	21	2.400	0.217	0.367	0.898	0.330
Ship	**Total**				**312**	**2.222**	**0.225**	**0.390**	**0.898**	**0.350**

2.6. Bottlenose dolphin

Table D-9. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for bottlenose dolphin in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	379	4.300	0.772	0.997	0.860	0.858
		moderate	180	200	47	3.700	0.771	0.996	0.670	0.667
	Aegean	good	180	210.6	30	3.800	0.771	0.986	0.860	0.848
		moderate	180	229	1	3.000	0.771	0.988	0.670	0.662
	Ionian	good	180	211.8	108	5.000	0.771	0.987	0.860	0.849
		moderate	180	229	16	5.100	0.771	0.981	0.670	0.657
	Levantine	good	180	206	10	4.600	0.771	0.990	0.860	0.851
		moderate	180	229	0	4.500	0.771	0.998	0.670	0.669
	WMed	good	180	208.1	274	5.300	0.771	0.992	0.860	0.854
		moderate	180	216.2	31	5.100	0.771	0.993	0.670	0.665
Plane	**Total**				**896**	**4.711**	**0.771**	**0.991**	**0.793**	**0.785**
ship	Adriatic	good	19	10.3	27	6.200	0.953	1.000	0.856	0.856
		moderate	15	0.9	0	6.400	0.964	1.000	0.856	0.856
	Aegean	good	13	2.9	32	4.800	0.975	0.999	0.856	0.855
		moderate	15	2.1	6	5.300	0.957	1.000	0.856	0.856
	Ionian	good	16	4.2	28	4.800	0.946	1.000	0.856	0.856
		moderate	14	2.5	0	5.500	0.957	1.000	0.856	0.856
	Levantine	good	14	2.4	5	4.500	0.974	0.999	0.856	0.855
		moderate	14	1.9	1	4.800	0.950	1.000	0.856	0.856
	WMed	good	15	6.8	863	9.800	0.973	0.999	0.862	0.861
		moderate	16	8.1	115	11.700	0.968	0.999	0.878	0.877
Ship	**Total**				**1,077**	**7.554**	**0.968**	**0.999**	**0.860**	**0.860**

2.7. Common dolphin

Table D-10. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for common dolphin in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	1	24.100	0.667	1.000	0.994	0.994
		moderate	180	200	0	25.900	0.667	1.000	0.994	0.994
	Aegean	good	180	210.6	4	12.200	0.668	1.000	0.780	0.780
		moderate	180	229	0	16.000	0.667	1.000	0.560	0.560
	Ionian	good	180	211.8	84	19.100	0.667	0.999	0.941	0.940
		moderate	180	229	4	20.300	0.667	0.999	0.907	0.907
	Levantine	good	180	206	7	11.800	0.667	1.000	0.780	0.780
		moderate	180	229	2	13.000	0.667	1.000	0.560	0.560
	WMed	good	180	208.1	27	46.200	0.668	0.995	0.975	0.972
		moderate	180	216.2	0	47.200	0.667	0.993	0.967	0.963
Plane	**Total**				**129**	**29.980**	**0.667**	**0.994**	**0.902**	**0.898**
ship	Adriatic	good	19	5.4	2	20.400	0.794	0.989	0.954	0.945
		moderate	16	0.7	0	19.700	0.833	1.000	0.942	0.942
	Aegean	good	13	3	13	8.600	0.964	1.000	0.856	0.856
		moderate	14	2.5	0	8.800	0.962	1.000	0.856	0.856
	Ionian	good	16	3.8	5	19.500	0.890	1.000	0.949	0.949
		moderate	14	1.8	0	22.600	0.870	1.000	0.970	0.970
	Levantine	good	14	3	12	11.200	0.922	1.000	0.856	0.856
		moderate	14	1.8	0	12.400	0.935	1.000	0.856	0.856
	WMed	good	15	6	1,270	42.300	0.946	0.999	0.946	0.945
		moderate	21	11.6	113	38.900	0.880	1.000	0.938	0.938
Ship	**Total**				**1,415**	**28.408**	**0.923**	**0.999**	**0.919**	**0.918**

2.8. Striped dolphin

Table D-11. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for striped dolphin in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	175	14.500	0.667	1.000	0.780	0.780
		moderate	180	195.8	34	14.700	0.667	1.000	0.560	0.560
	Aegean	good	180	210.6	13	15.300	0.667	1.000	0.780	0.780
		moderate	180	198.3	1	16.800	0.667	1.000	0.560	0.560
	Ionian	good	180	211.8	265	17.400	0.667	1.000	0.834	0.834
		moderate	180	211.8	44	17.400	0.667	1.000	0.669	0.669
	Levantine	good	180	206	11	17.000	0.667	0.998	0.887	0.886
		moderate	180	206	0	17.000	0.667	0.998	0.777	0.776
	WMed	good	180	208.1	2,407	18.200	0.667	0.986	0.864	0.852
		moderate	180	207.2	238	18.200	0.667	0.985	0.738	0.729
Plane	**Total**				**3,188**	**17.348**	**0.667**	**0.992**	**0.773**	**0.768**
ship	Adriatic	good	19	5.4	33	10.700	0.959	1.000	0.856	0.856
		moderate	17	0.5	0	12.100	0.989	1.000	0.856	0.856
	Aegean	good	13	2.8	23	12.500	0.970	1.000	0.862	0.862
	Ionian	good	16	3.9	39	14.600	0.903	0.998	0.877	0.875
		moderate	14	4.2	1	14.200	0.895	1.000	0.879	0.879
	Levantine	good	14	2.2	26	13.100	0.958	1.000	0.865	0.865
		moderate	19	0.5	0	17.600	0.988	1.000	0.856	0.856
	WMed	good	15	6.5	5,487	21.300	0.975	1.000	0.909	0.909
		moderate	17	9.9	223	29.700	0.906	1.000	0.921	0.921
Ship	**Total**				**5,832**	**19.150**	**0.957**	**1.000**	**0.895**	**0.894**

2.9. Harbor porpoise

Table D-12. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for harbor porpoise in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
Plane	**Total**				**0**	**2.120**	**0.434**	**0.675**	**0.520**	**0.351**
ship	Aegean	good	12	2.4	16	1.800	0.996	1.000	0.350	0.350
		moderate	10	2.7	0	1.800	0.997	1.000	0.350	0.350
	Ionian	good	17	1.4	0	1.900	0.994	1.000	0.350	0.350
	Levantine	good	17	1.4	0	1.900	0.994	1.000	0.350	0.350
	WMed	good	11	2.8	2	3.000	0.996	1.000	0.350	0.350
		moderate	11	2.7	0	3.000	0.787	0.851	0.350	0.298
Ship	**Total**				**18**	**2.864**	**0.916**	**0.945**	**0.355**	**0.334**

2.10. Killer whale

Table D-13. Correction factors applied per platform type (mean values over all the surveys within each platform type, block and Subjective Code (sightability conditions)) for killer whale in the Mediterranean.

Platform	Block	Subjective Code	Mean Speed	Mean Height	n	Mean group size	Mean a	Mean corr. a	Mean p	Mean g(0)
plane	Adriatic	good	180	202.4	0	8.500	0.097	0.579	0.540	0.313
		moderate	180	200	0	8.500	0.097	0.579	0.540	0.313
	Aegean	good	180	210.6	0	8.500	0.097	0.579	0.540	0.313
		moderate	180	229	0	8.500	0.097	0.579	0.540	0.313
	Ionian	good	180	211.8	0	8.500	0.097	0.579	0.540	0.313
		moderate	180	229	0	8.500	0.097	0.579	0.540	0.313
	Levantine	good	180	206	0	8.500	0.097	0.579	0.540	0.313
		moderate	180	229	0	8.500	0.097	0.579	0.540	0.313
	WMed	good	180	212.9	1	8.600	0.097	0.582	0.540	0.315
		moderate	180	221.3	0	8.500	0.097	0.579	0.540	0.313
Plane	**Total**				**1**	**8.528**	**0.097**	**0.580**	**0.540**	**0.314**
ship	Aegean	good	11	2.5	0	8.500	0.186	0.825	0.641	0.529
	WMed	good	14	4.4	63	8.300	0.343	0.854	0.641	0.548
		moderate	10	2.7	18	9.500	0.999	1.000	0.641	0.641
Ship	**Total**				**81**	**8.457**	**0.377**	**0.863**	**0.641**	**0.553**

E

Summaries and smooth plots of the spatial models

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Appendix E: Summaries and smooth plots of the spatial models

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1. Spatial models for the Black Sea

1.1. Bottlenose dolphin

1.1.1. Block: BSonly - allyear

Number of observations: 969

Number of individuals: 3013.76

Formula: size~s(Lon, Lat, k = 15, bs = "ts") + s(pmax(pmin(Depth, 0), -2479.1908), k = 6, bs = "ts") + s(pmax(pmin(Salinity, 18.5692), 14.2382), k = 6, bs = "ts") + s(pmax(pmin(Sst, 20.145), 8.4665), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Salinity + Sst + Lon,Lat

Deviance explained: 16.56 %

Table E-1. Summary of the best model for bottlenose dolphin in block BSonly.

Family:	Tweedie(p=1.464)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-1.4723	0.0592	-24.8709	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	12.315	14	10.6842	0
s(pmax(pmin(Depth, 0), -2479.1908))	3.766	5	15.3349	0
s(pmax(pmin(Salinity, 18.5692), 14.2382))	4.243	5	6.3277	0
s(pmax(pmin(Sst, 20.145), 8.4665))	4.318	5	6.5302	0

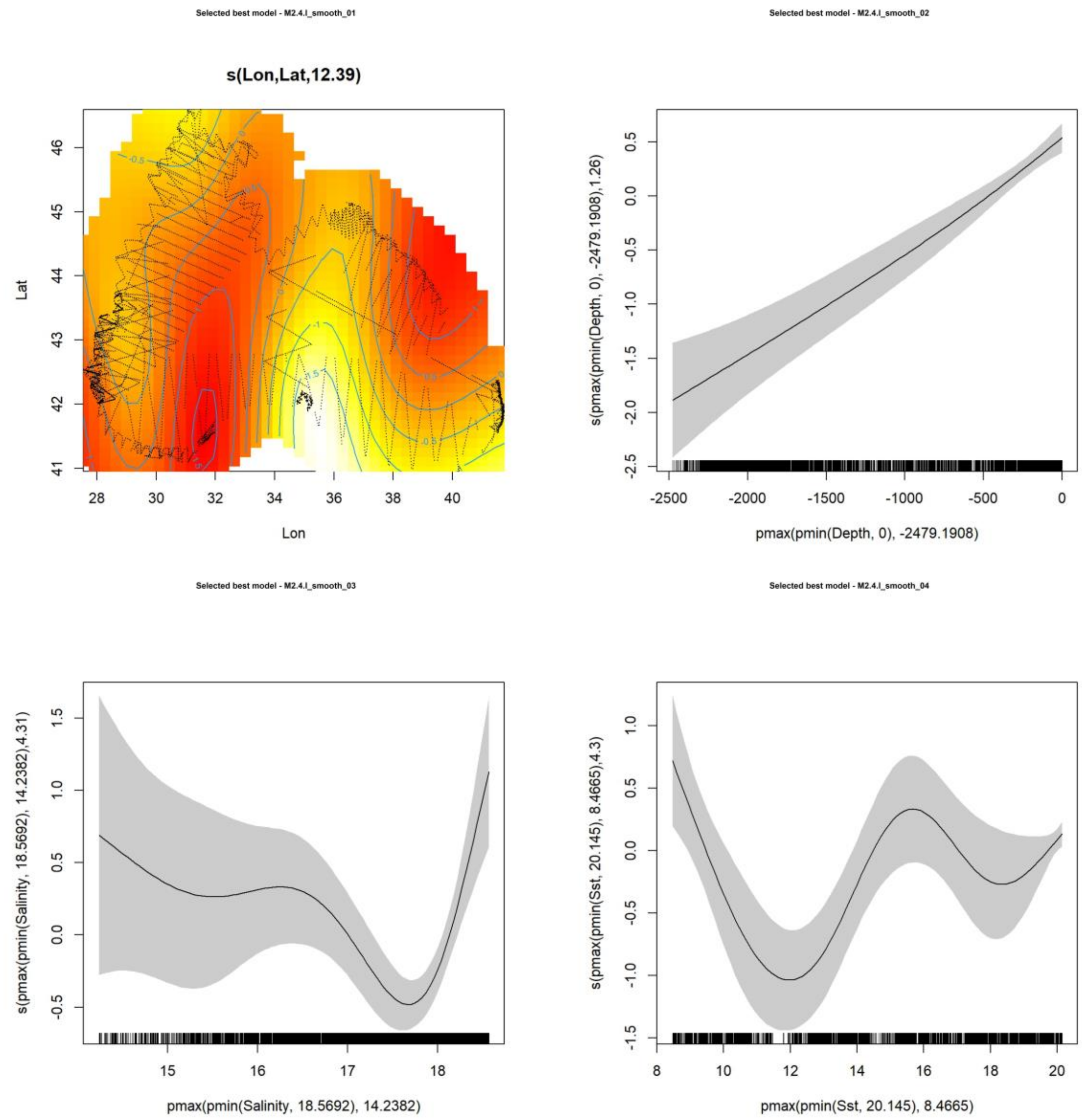


Figure E-1. Smooth plots for the covariates in the spatial model.

1.1.2. Block: Azov - summer

Number of observations: 42

Number of individuals: 145

Formula: size~s(Lon, Lat, k = 15, bs = "ts") + s(pmax(pmin(Depth, 0), -17.2049), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Lon,Lat

Deviance explained: 53.55 %

Table E-2. Summary of the best model for bottlenose dolphin in block Azov.

Family:	Tweedie(p=1.411)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-6.5186	0.8382	-7.7772	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	1.964	14	0.8528	0.0016
s(pmax(pmin(Depth, 0), -17.2049))	1.099	5	4.0377	0

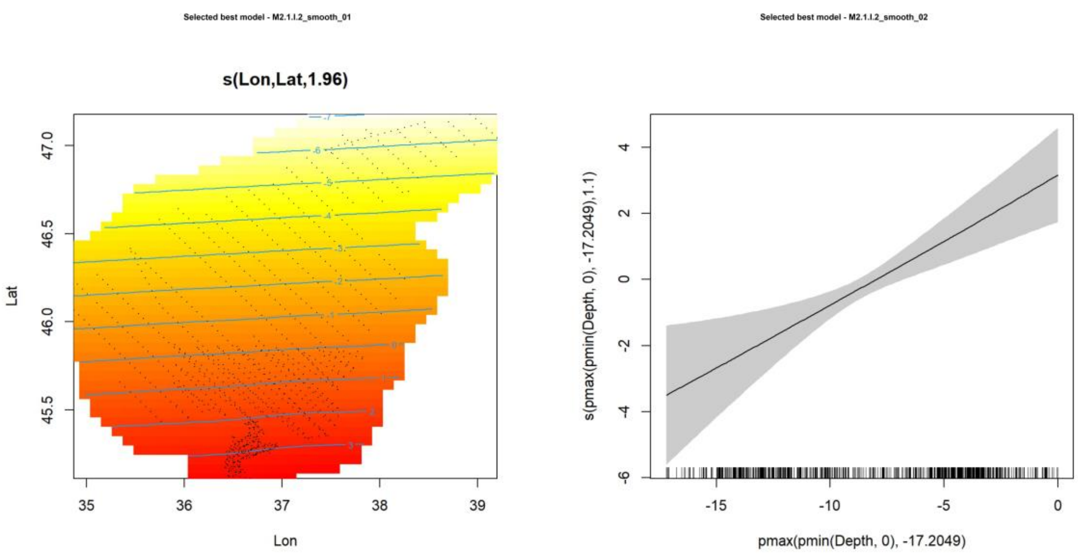


Figure E-2. Smooth plots for the covariates in the spatial model.

1.2. Common dolphin

1.2.1. Block: BSonly - allyear

Number of observations: 2320

Number of individuals: 8425

Formula: size~s(Lon, Lat, k = 15, bs = "ts") + s(pmax(pmin(Ssh, 0.238), 0.011), k = 6, bs = "ts") + s(pmax(pmin(Sst, 20.145), 8.4666), k = 6, bs = "ts") + s(pmax(pmin(Sst_sd, 2.388), 0.2813), k = 6, bs = "ts") + offset(log(offset))

Covariates: Ssh + Sst + Sst_sd + Lon,Lat

Deviance explained: 15.69 %

Table E-3. Summary of the best model for common dolphin in block BSonly.

Family:	Tweedie(p=1.478)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.5986	0.0427	-14.0081	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	12.222	14	22.9332	0
s(pmax(pmin(Ssh, 0.238), 0.011))	2.773	5	2.3101	0.0037
s(pmax(pmin(Sst, 20.145), 8.4666))	3.134	5	3.1023	7e-04
s(pmax(pmin(Sst_sd, 2.388), 0.2813))	3.894	5	4.0482	1e-04

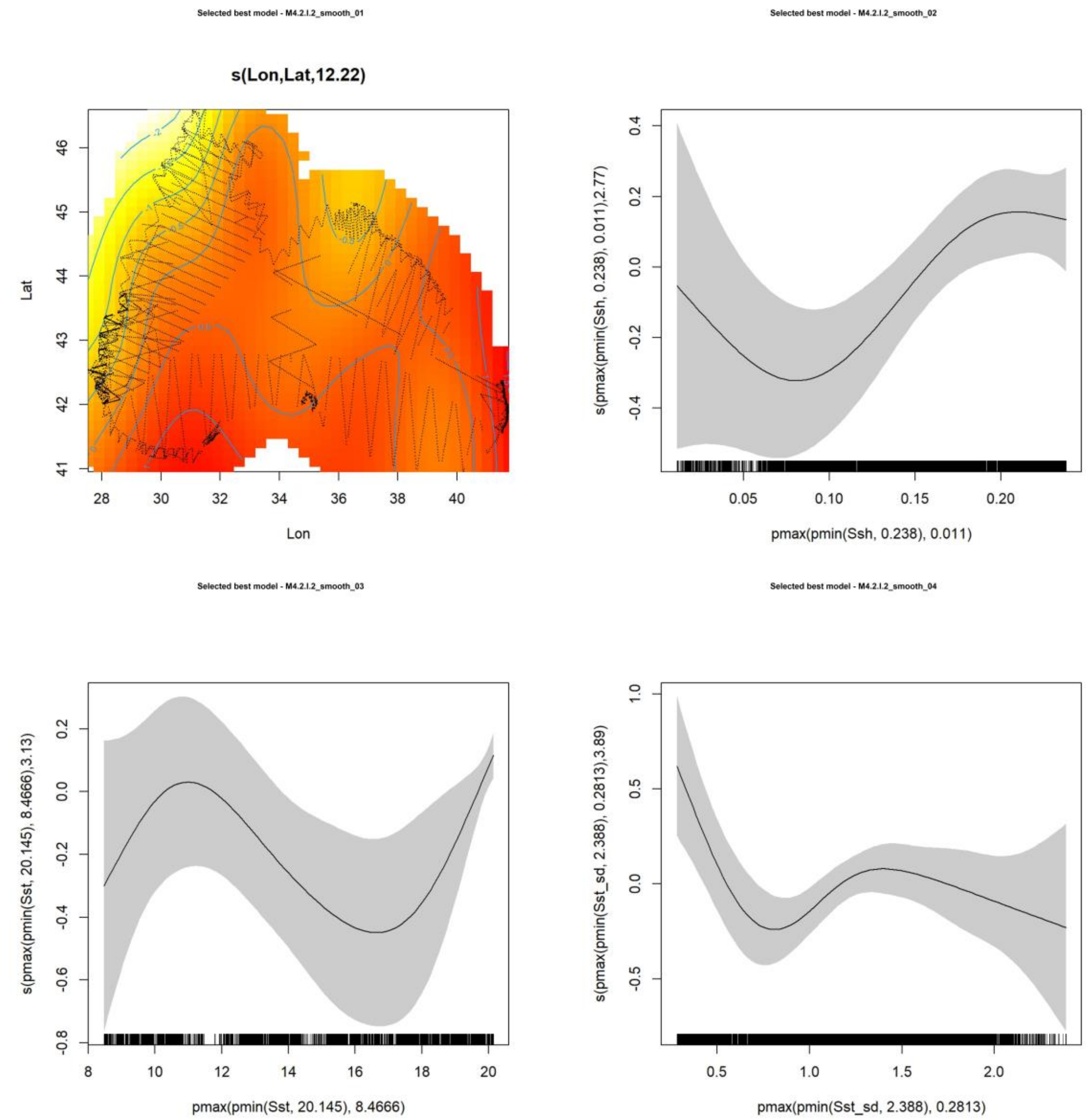


Figure E-3. Smooth plots for the covariates in the spatial model.

1.3. Harbor porpoise

1.3.1. Block: BSonly - summer

Number of observations: 2074

Number of individuals: 3542

Formula: size~s(Lon, Lat, k = 15, bs = "ts") + s(pmax(pmin(Chl, 4.5282), 0.0218), k = 6, bs = "ts") + s(pmax(pmin(Ssh, 0.3524), 0.0112), k = 6, bs = "ts") + s(pmax(pmin(Sst, 26.2985), 13.6791), k = 6, bs = "ts") + s(pmax(pmin(Sst_sd, 4.5341), 0.4255), k = 6, bs = "ts") + offset(log(offset))

Covariates: Chl + Ssh + Sst + Sst_sd + Lon,Lat

Deviance explained: 23.01 %

Table E-4. Summary of the best model for harbor porpoise in block BSonly.

Family:	Tweedie(p=1.349)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.424	0.0474	-8.9452	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	12.202	14	32.1452	0
s(pmax(pmin(Chl, 4.5282), 0.0218))	4.474	5	14.6486	0
s(pmax(pmin(Ssh, 0.3524), 0.0112))	3.395	5	8.0099	0
s(pmax(pmin(Sst, 26.2985), 13.6791))	2.883	5	4.7893	0
s(pmax(pmin(Sst_sd, 4.5341), 0.4255))	3.859	5	6.1052	0

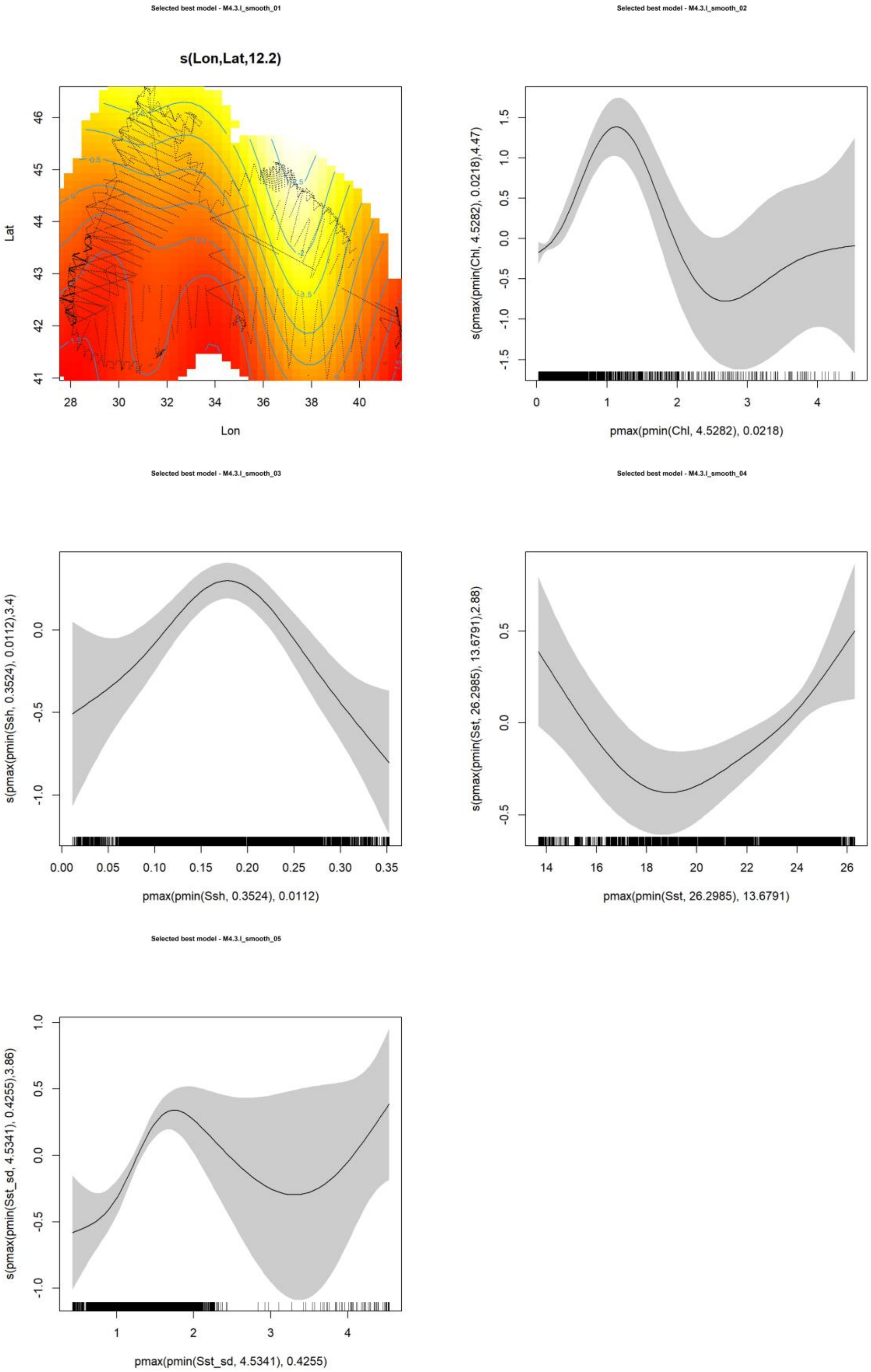


Figure E-4. Smooth plots for the covariates in the spatial model.

1.3.2. Block: BSonly - winter

Number of observations: 1405

Number of individuals: 6739

Formula: size~s(pmax(pmin(Depth, 0), -2002.8158), k = 6, bs = "ts") + s(pmax(pmin(Sst_sd, 1.7821), 0.2622), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Sst_sd

Deviance explained: 20.22 %

Table E-5. Summary of the best model for harbor porpoise in block BSonly.

Family:	Tweedie(p=1.574)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.621	0.1094	5.6751	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Depth, 0), -2002.8158))	3.607	5	6.6537	0
s(pmax(pmin(Sst_sd, 1.7821), 0.2622))	4.066	5	40.2971	0

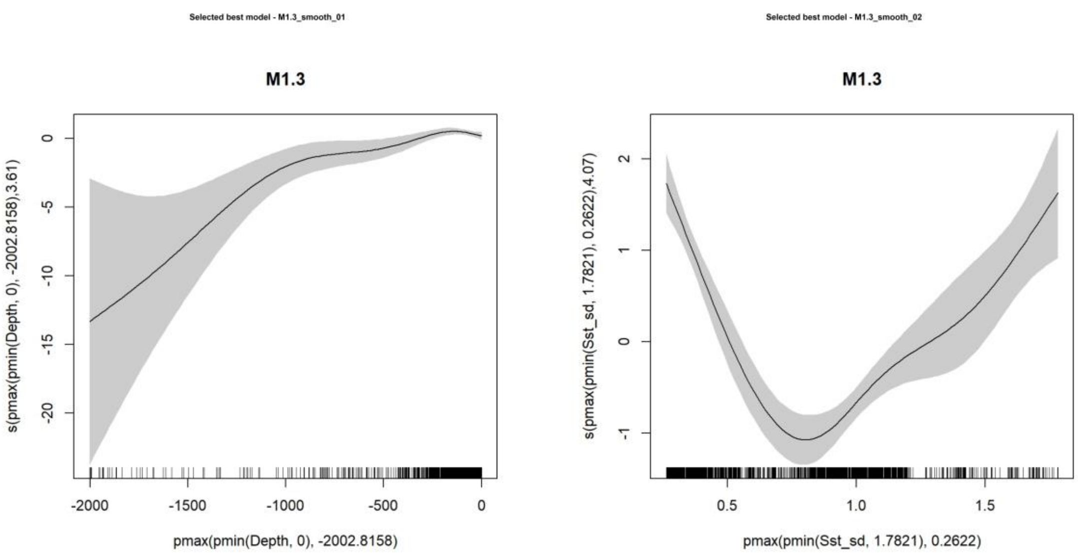


Figure E-5. Smooth plots for the covariates in the spatial model.

1.3.3. Block: Azov - summer

Number of observations: 112

Number of individuals: 168.5

Formula: size~te(Lon, Lat, k = covariates.lonlat.k[i], bs = "ts") + offset(log(offset))

Covariates: LonLat20

Deviance explained: 43.68 %

Table E-6. Summary of the best model for harbor porpoise in block Azov.

Family:	Tweedie(p=1.165)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-2.7092	0.8773	-3.0881	0.0021
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
te(Lon,Lat)	35.867	370	0.3815	0

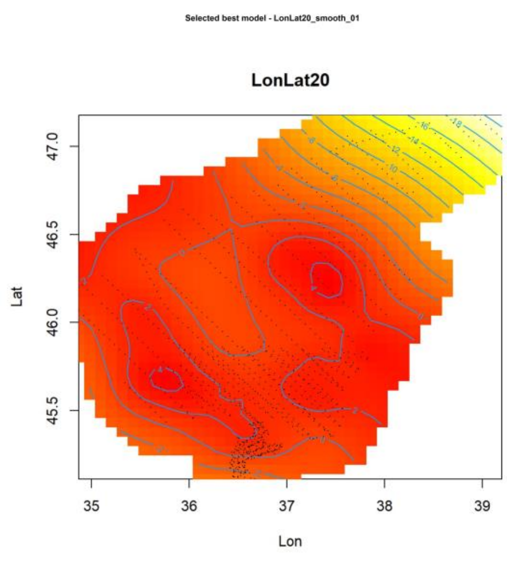


Figure E-6. Smooth plots for the covariates in the spatial model.

2. Spatial models for the Mediterranean

2.1. Fin whale

2.1.1. Block: Gibraltar - year-round

Number of observations: 56

Number of individuals: 82.5

Formula: size~te(Lon, Lat, k = covariates.lonlat.k[i], bs = "ts") + offset(log(offset))

Covariates: LonLat20

Deviance explained: 2.5 %

Table E-7. Summary of the best model for fin whale in block Gibraltar.

Family:	Tweedie(p=1.254)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.3072	0.1842	-28.8091	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
te(Lon,Lat)	2.709	289	0.0112	0.26

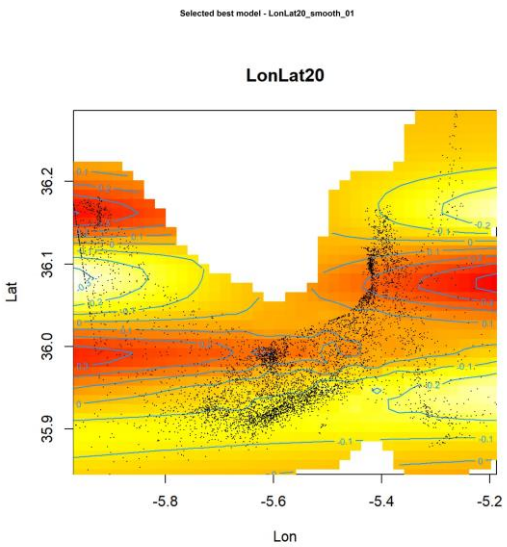


Figure E-7. Smooth plots for the covariates in the spatial model.

2.1.2. Block: noGibraltar - year-round

Number of observations: 2804

Number of individuals: 4137

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(DistToAtl, k = 6, bs = "ts") + s(pmax(pmin(Ssh, -0.2629), -0.5631), k = 6, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + s(WindFetch, k = 6, bs = "ts") + offset(log(offset))

Covariates: DistToAtl + Ssh + Depth + WindFetch + Lon,Lat

Deviance explained: 22.12 %

Table E-8. Summary of the best model for fin whale in block noGibraltar.

Family:	Tweedie(p=1.252)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-81.673	10.5295	-7.7566	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	16.995	19	11.1647	0
s(DistToAtl)	4.355	5	17.4502	0
s(pmax(pmin(Ssh, -0.2629), -0.5631))	3.901	5	11.7646	0
s(pmin(Depth, 0))	4.53	5	19.2687	0
s(WindFetch)	4.1	5	11.5319	0

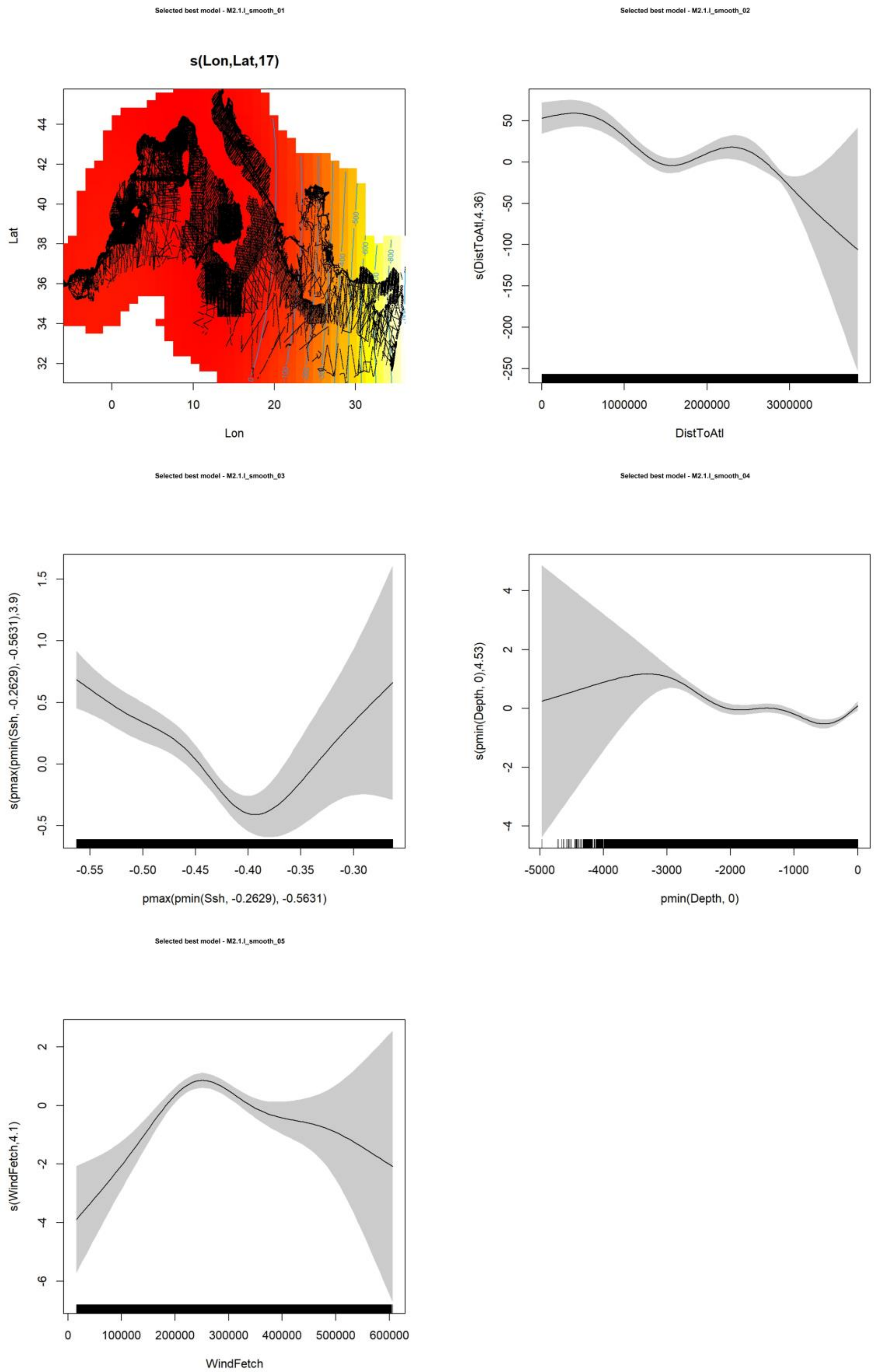


Figure E-8. Smooth plots for the covariates in the spatial model.

2.2. Sperm whale

2.2.1. Block: EMed - summer

Number of observations: 156

Number of individuals: 811.5

Formula: size~s(Lon, Lat, k = 15, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + s(pmin(Salinity, 39.4219), k = 6, bs = "ts") + s(SlopePct, k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Salinity + SlopePct + Lon,Lat

Deviance explained: 15.23 %

Table E-9. Summary of the best model for sperm whale in block EMed.

Family:	Tweedie(p=1.302)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-9.5976	0.3753	-25.5737	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	1.742	14	0.7857	0.0014
s(pmin(Depth, 0))	4.03	5	7.2661	0
s(pmin(Salinity, 39.4219))	0.929	5	1.7221	0.0017
s(SlopePct)	2.5	5	2.7556	8e-04

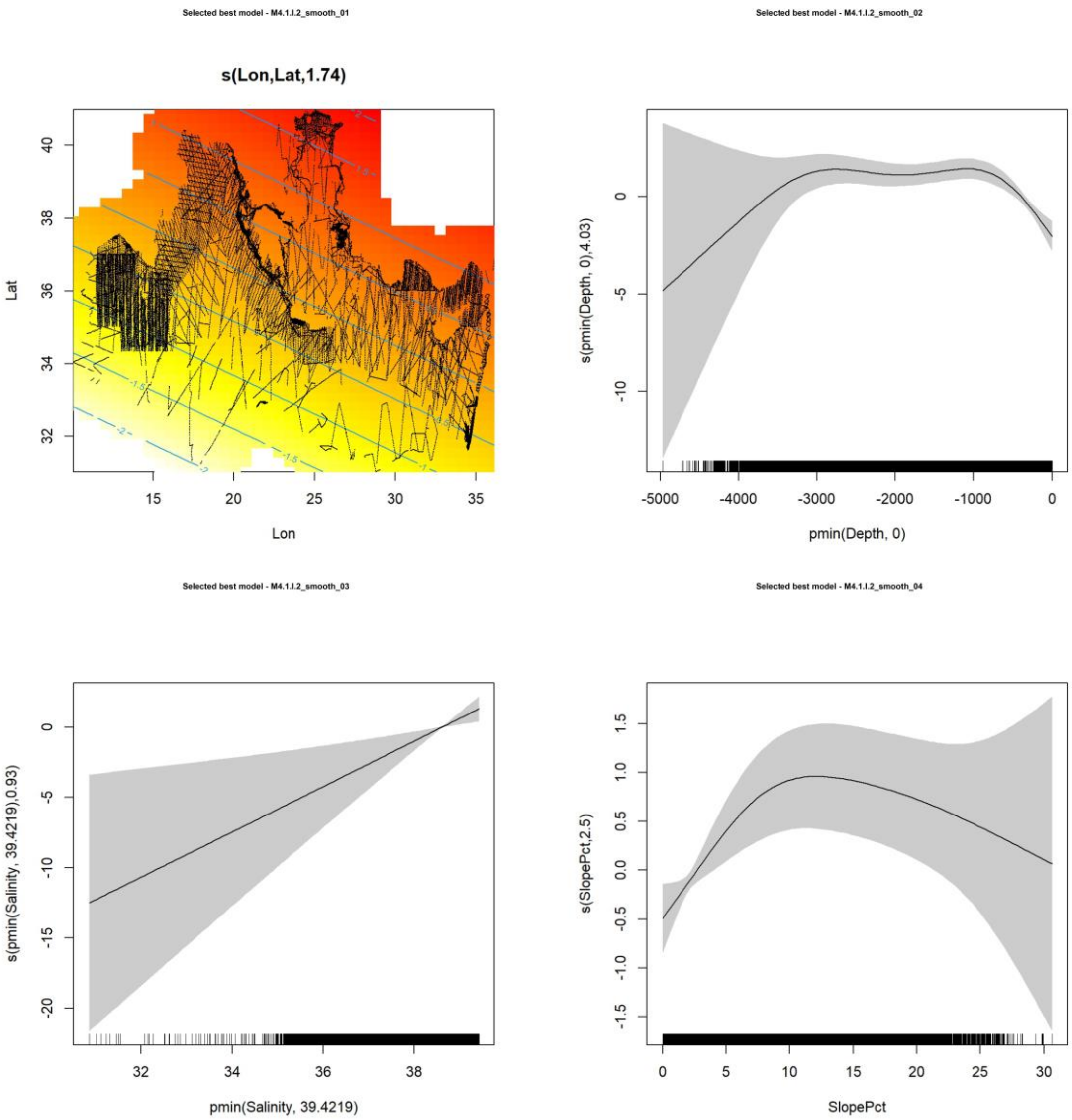


Figure E-9. Smooth plots for the covariates in the spatial model.

2.2.2. Block: Gibraltar - year-round

Number of observations: 362

Number of individuals: 442.5

Formula: size~s(pmax(pmin(Depth, 0), -902.558), k = 6, bs = "ts") + s(pmin(Lon, -5.263), k = 10, bs = "ts") + offset(log(offset))

Covariates: Depth + Lon

Deviance explained: 19.48 %

Table E-10. Summary of the best model for sperm whale in block Gibraltar.

Family:	Tweedie(p=1.382)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.367	0.1457	-23.1123	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Depth, 0), -902.558))	0.905	5	1.3548	0.0048
s(pmin(Lon, -5.263))	4.847	9	8.5321	0

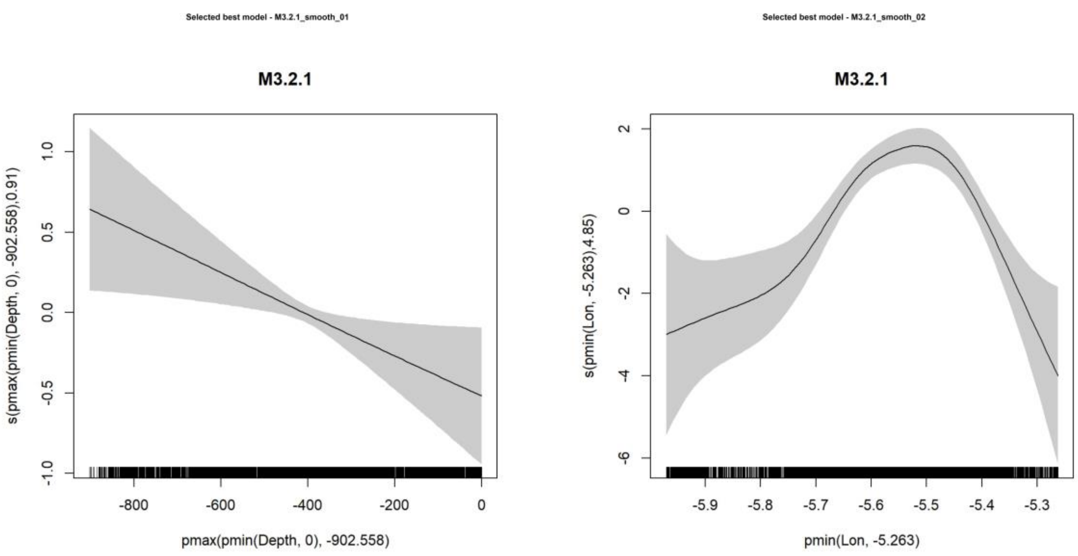


Figure E-10. Smooth plots for the covariates in the spatial model.

2.2.3. Block: WMed - year-round

Number of observations: 1698

Number of individuals: 2615.5

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(pmax(pmin(Depth, 0), -3632.181), k = 6, bs = "ts") + s(pmin(DistToAtl, 1904616.7), k = 6, bs = "ts") + s(pmin(SlopePct, 14.1972), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + DistToAtl + SlopePct + Lon,Lat

Deviance explained: 23.95 %

Table E-11. Summary of the best model for sperm whale in block WMed.

Family:	Tweedie(p=1.298)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.9259	0.0545	-108.7889	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	17.152	19	20.8849	0
s(pmax(pmin(Depth, 0), -3632.181))	2.661	5	5.4217	0
s(pmin(DistToAtl, 1904616.7))	3.675	5	4.3042	0
s(pmin(SlopePct, 14.1972))	3.542	5	23.1352	0

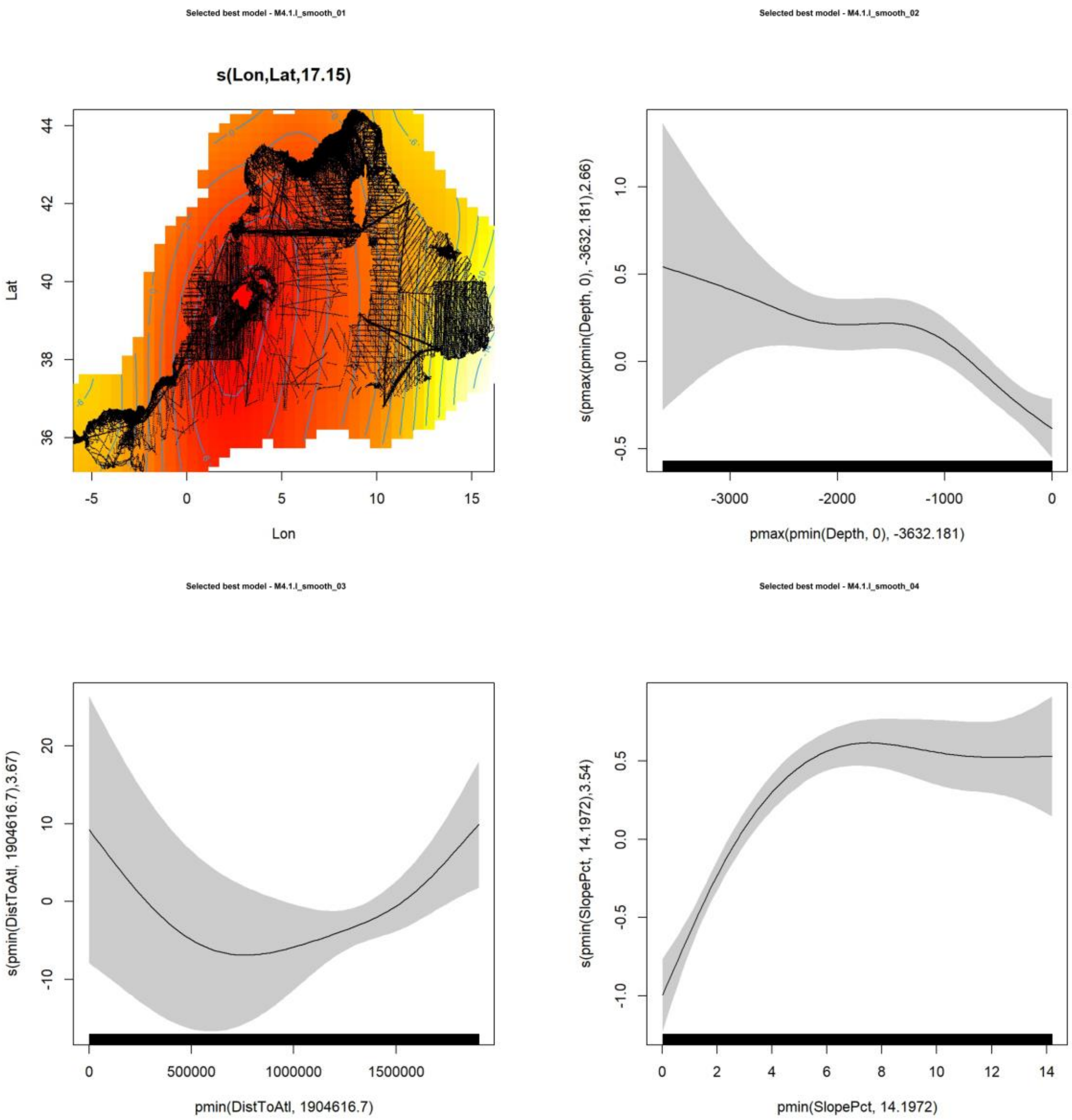


Figure E-11. Smooth plots for the covariates in the spatial model.

2.3. Risso's dolphin

2.3.1. Block: All - year-round

Number of observations: 586

Number of individuals: 4769.5

Formula: size~s(DistAbyss, k = 6, bs = "ts") + s(DistToAtl, k = 6, bs = "ts") + s(pmin(Chl_front_dist, 24.1221), k = 6, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistAbyss + DistToAtl + Chl_front_dist + Depth

Deviance explained: 13.18 %

Table E-12. Summary of the best model for risso's dolphin in block All.

Family:	Tweedie(p=1.424)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.9224	0.1194	-49.6112	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(DistAbyss)	1.316	5	17.7061	0
s(DistToAtl)	4.15	5	23.2125	0
s(pmin(Chl_front_dist, 24.1221))	2.611	5	4.5937	0
s(pmin(Depth, 0))	1.05	5	4.3175	0

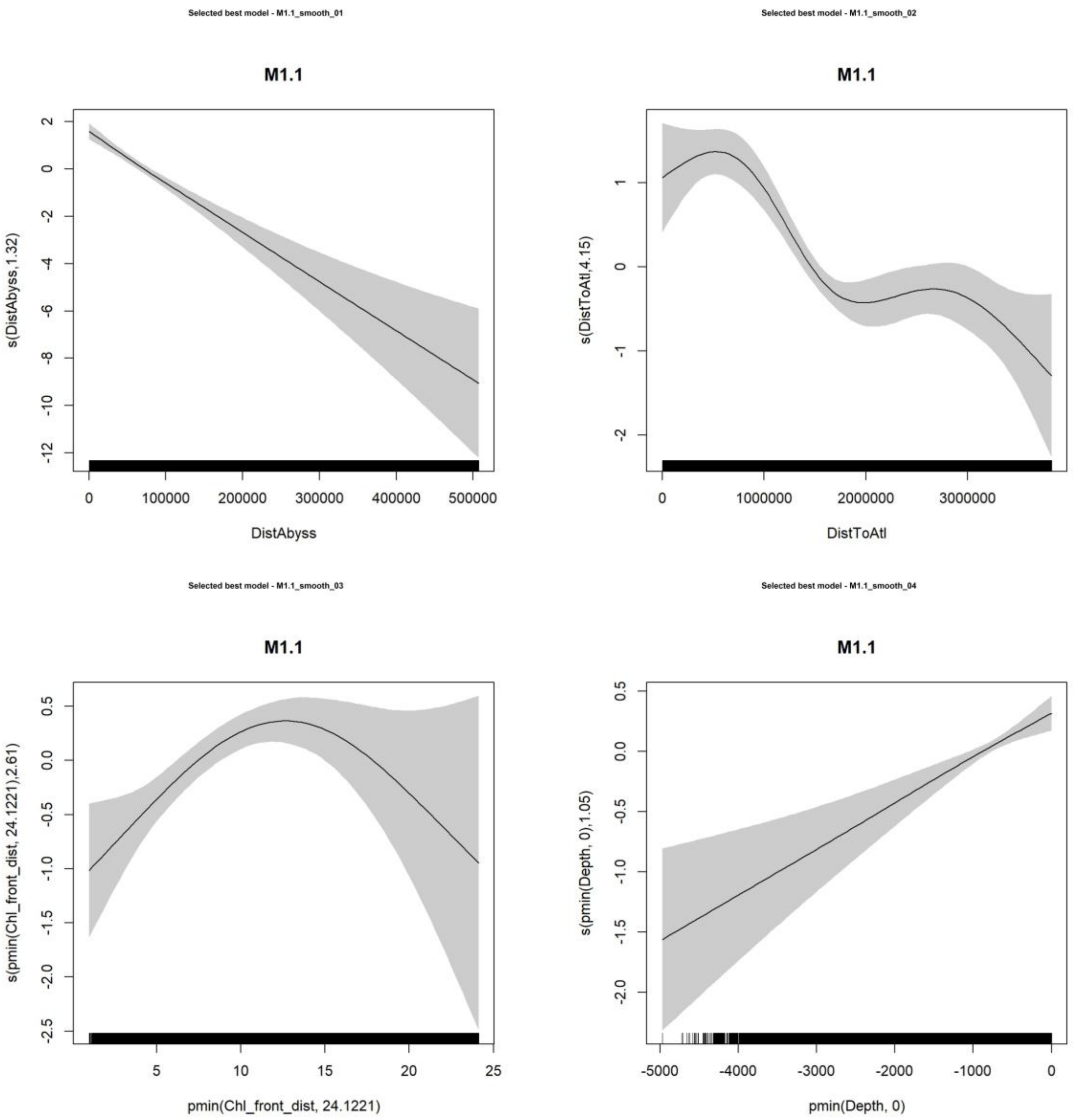


Figure E-12. Smooth plots for the covariates in the spatial model.

2.4. Long-finned pilot whale

2.4.1. Block: Wmed-Ion-noAlboran - year-round

Number of observations: 170

Number of individuals: 1867.5

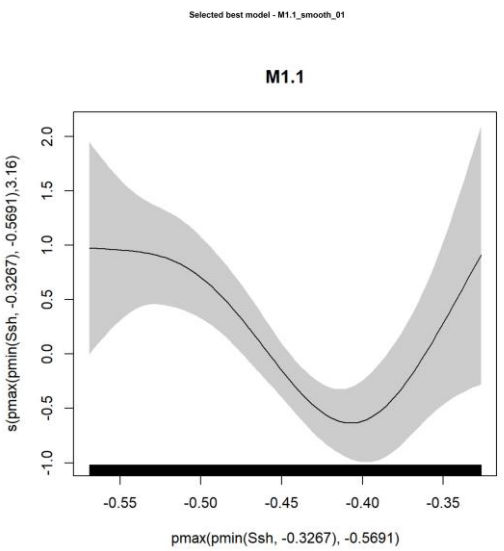
Formula: size~s(pmax(pmin(Ssh, -0.3267), -0.5691), k = 6, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + offset(log(offset))

Covariates: Ssh + Depth

Deviance explained: 8.8 %

Table E-13. Summary of the best model for long-finned pilot whale in block Wmed-Ion-noAlboran.

Family:	Tweedie(p=1.483)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-6.4384	0.128	-50.3178	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Ssh, -0.3267), -0.5691))	3.162	5	4.6326	0
s(pmin(Depth, 0))	0.92	5	1.5695	0.003



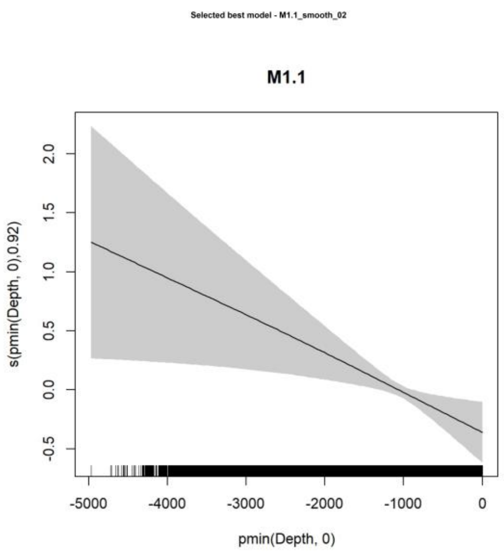


Figure E-13. Smooth plots for the covariates in the spatial model.

2.4.2. Block: Alboran - year-round

Number of observations: 488

Number of individuals: 13841

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(pmax(pmin(Depth, -9.2733), -2695.955), k = 6, bs = "ts") + s(pmax(pmin(Sst, 25.7446), 14.7432), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Sst + Lon,Lat

Deviance explained: 21.96 %

Table E-14. Summary of the best model for long-finned pilot whale in block Alboran.

Family:	Tweedie(p=1.472)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.4646	0.1103	-31.412	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	9.618	19	2.8307	0
s(pmax(pmin(Depth, -9.2733), -2695.955))	4.511	5	39.5196	0
s(pmax(pmin(Sst, 25.7446), 14.7432))	1.022	5	3.1546	0

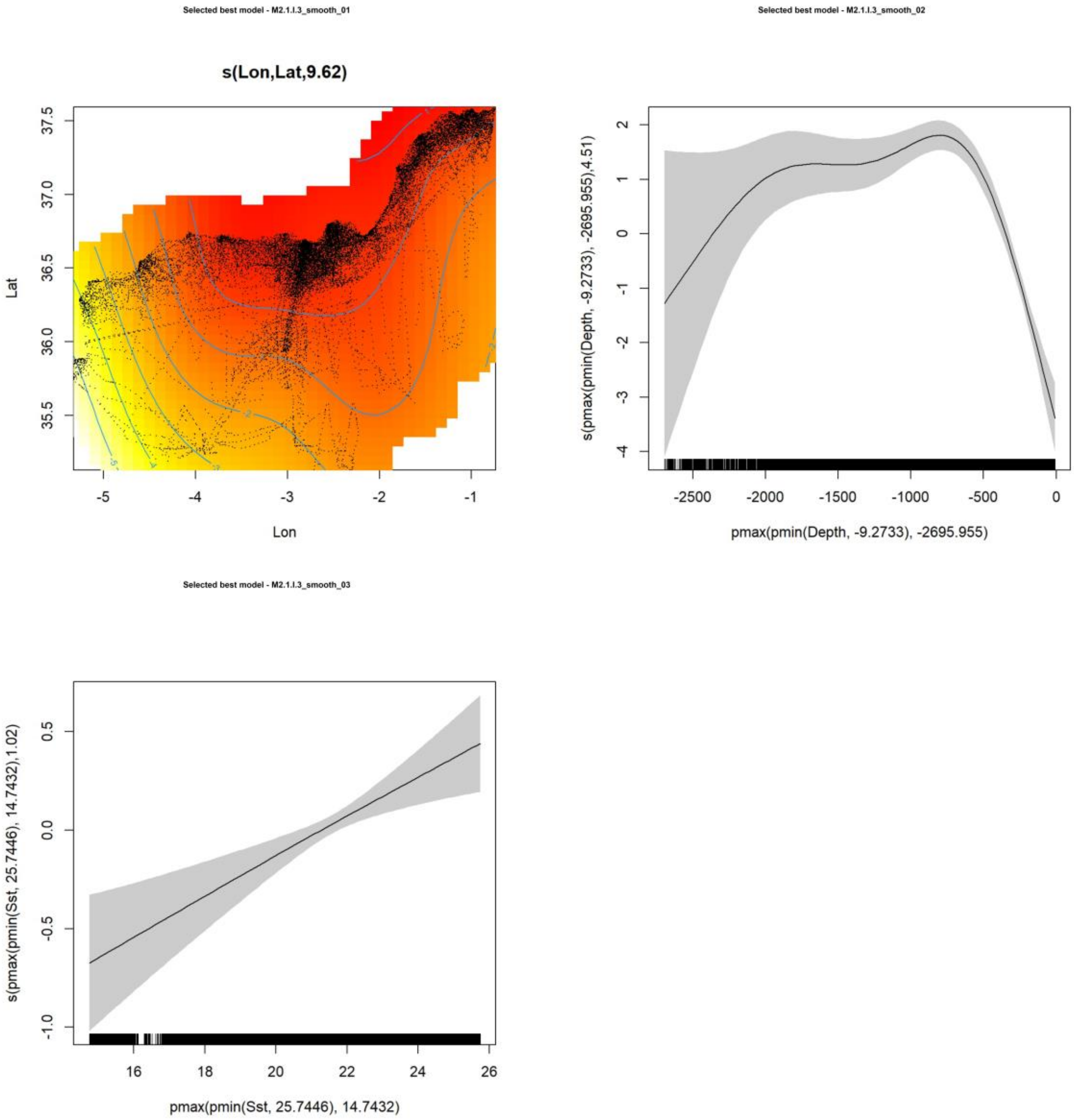


Figure E-14. Smooth plots for the covariates in the spatial model.

2.4.3. Block: Gibraltar - year-round

Number of observations: 366

Number of individuals: 13024

Formula: size~s(Lon, Lat, k = 15, bs = "ts") + s(pmax(pmin(Depth, 0), -902.558), k = 6, bs = "ts") + s(pmin(DistSlope, 14004.798), k = 2, bs = "ts") + s(pmin(SlopePct, 9.6183), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + DistSlope + SlopePct + Lon,Lat

Deviance explained: 20.73 %

Table E-15. Summary of the best model for long-finned pilot whale in block Gibraltar.

Family:	Tweedie(p=1.4)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.894	0.1365	-6.5472	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	9.977	14	7.8359	0
s(pmax(pmin(Depth, 0), -902.558))	1.06	5	1.9618	0
s(pmin(DistSlope, 14004.798))	0.909	2	2.211	9e-04
s(pmin(SlopePct, 9.6183))	0.928	5	1.184	0.0036

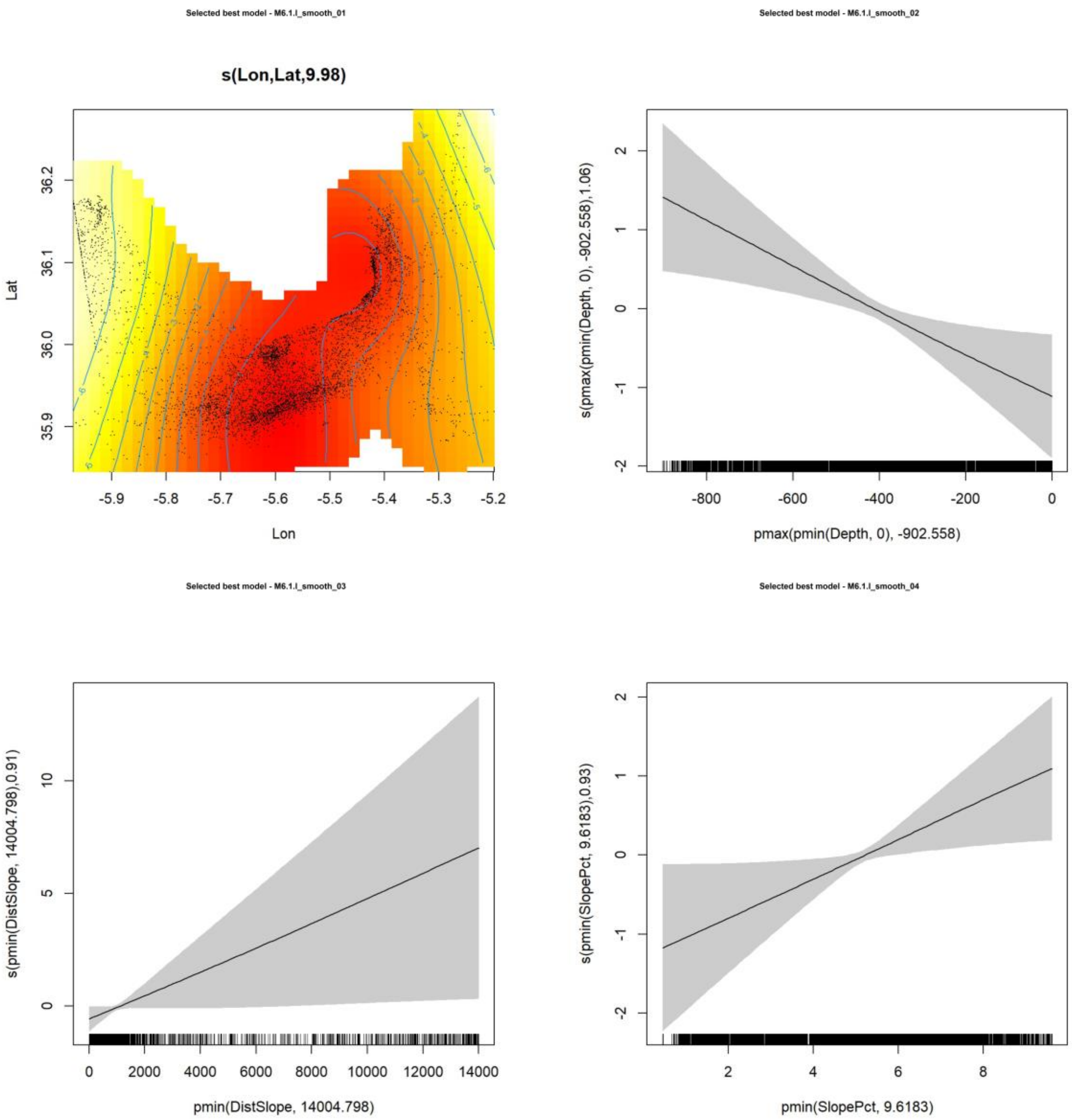


Figure E-15. Smooth plots for the covariates in the spatial model.

2.5. Cuvier's beaked whales

2.5.1. Block: WMed - year-round

Number of observations: 473

Number of individuals: 1095

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(pmax(pmin(Salinity, 38.3373), 36.4995), k = 6, bs = "ts") + s(pmin(DistCan, 122285.054), k = 6, bs = "ts") + s(pmin(SlopePct, 14.2801), k = 6, bs = "ts") + offset(log(offset))

Covariates: Salinity + DistCan + SlopePct + Lon,Lat

Deviance explained: 34.11 %

Table E-16. Summary of the best model for Cuvier's beaked whales in block WMed.

Family:	Tweedie(p=1.252)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-8.3895	0.2588	-32.415	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	17.674	19	20.4717	0
s(pmax(pmin(Salinity, 38.3373), 36.4995))	3.85	5	5.5632	0
s(pmin(DistCan, 122285.054))	1.141	5	5.272	0
s(pmin(SlopePct, 14.2801))	2.725	5	1.9678	0.0086

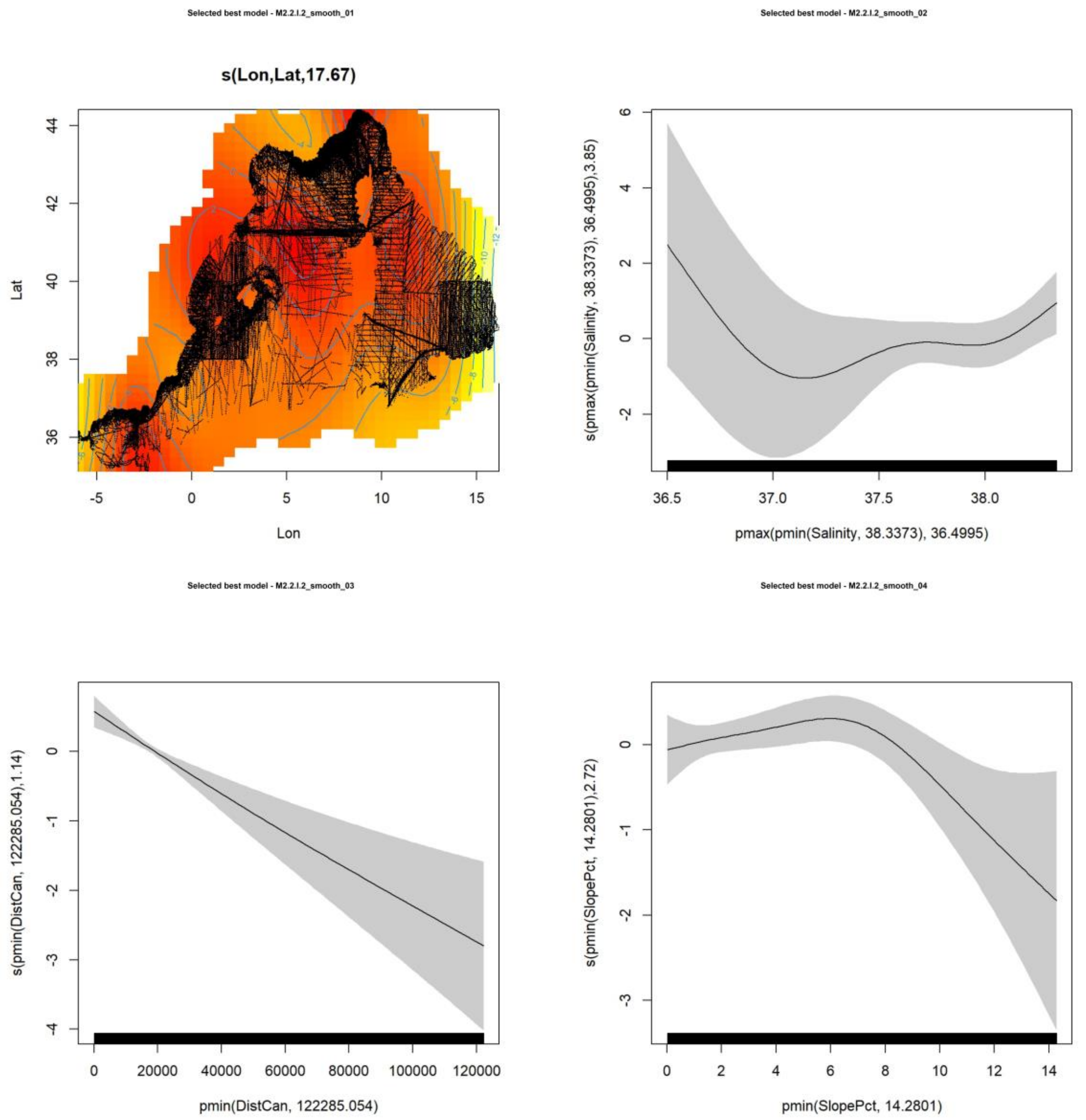


Figure E-16. Smooth plots for the covariates in the spatial model.

2.5.2. Block: EMed - year-round

Number of observations: 70

Number of individuals: 151.5

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(DistSlope, k = 2, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + s(SlopePct, k = 6, bs = "ts") + offset(log(offset))

Covariates: DistSlope + Depth + SlopePct + Lon,Lat

Deviance explained: 34.09 %

Table E-17. Summary of the best model for Cuvier's beaked whales in block EMed.

Family:	Tweedie(p=1.171)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-16.8703	2.7336	-6.1714	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	5.19	19	1.0051	7e-04
s(DistSlope)	0.951	2	9.2793	0
s(pmin(Depth, 0))	0.944	5	1.9522	9e-04
s(SlopePct)	0.957	5	3.2579	0

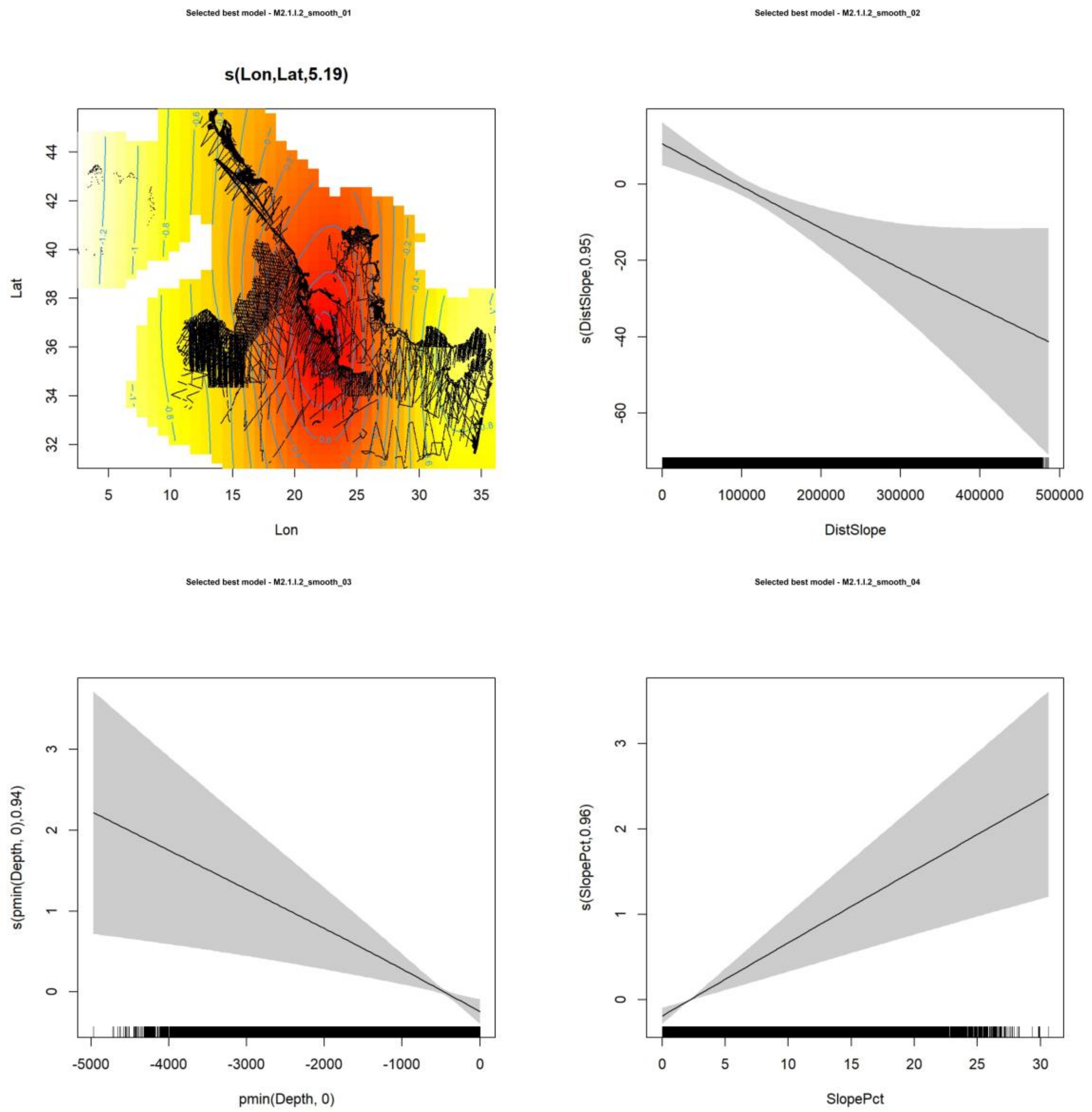


Figure E-17. Smooth plots for the covariates in the spatial model.

2.6. Bottlenose dolphin

2.6.1. Block: Adriatic - year-round

Number of observations: 672

Number of individuals: 3266.2276

Formula: size~s(DistEsc, k = 6, bs = "ts") + s(DistSlope, k = 2, bs = "ts") + s(pmax(pmin(Depth, 0), -1248.976), k = 6, bs = "ts") + s(pmax(pmin(Salinity, 38.7376), 34.8463), k = 6, bs = "ts") + s(pmax(pmin(Ssh, -0.3853), -0.5389), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistEsc + DistSlope + Depth + Salinity + Ssh

Deviance explained: 21.37 %

Table E-18. Summary of the best model for bottlenose dolphin in block Adriatic.

Family:	Tweedie(p=1.515)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-2.3648	0.0658	-35.9192	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(DistEsc)	3.765	5	5.734	0
s(DistSlope)	1.107	2	3.7327	3e-04
s(pmax(pmin(Depth, 0), -1248.976))	4.459	5	31.3161	0
s(pmax(pmin(Salinity, 38.7376), 34.8463))	4.347	5	19.9605	0
s(pmax(pmin(Ssh, -0.3853), -0.5389))	4.029	5	8.8563	0

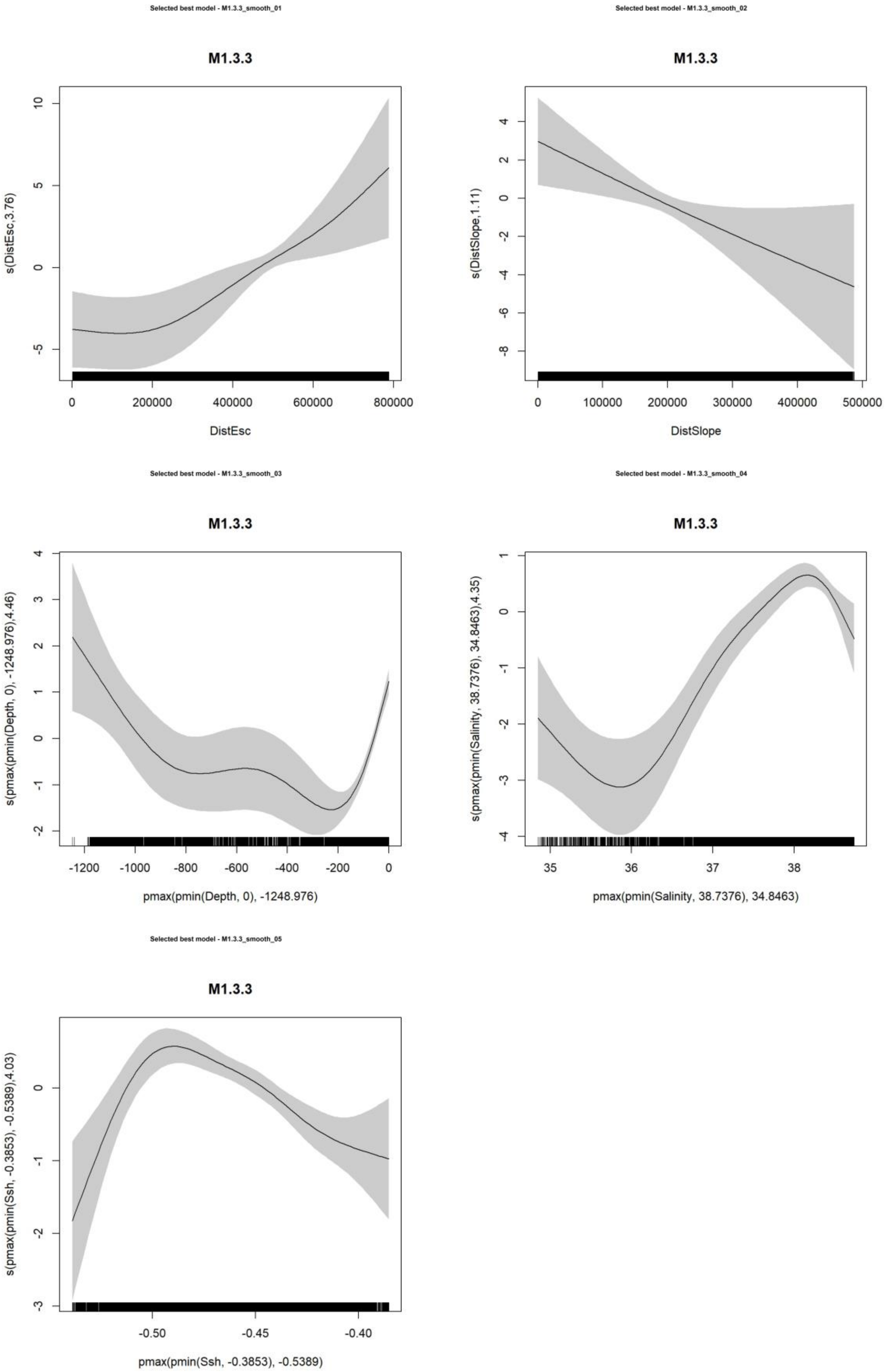


Figure E-18. Smooth plots for the covariates in the spatial model.

2.6.2. Block: Aegean - year-round

Number of observations: 214

Number of individuals: 937

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(pmax(pmin(Depth, 0), -1023.738), k = 6, bs = "ts") + s(pmax(pmin(Salinity, 39.2709), 34.9956), k = 6, bs = "ts") + s(pmin(Sst_front_dist, 16.2256), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Salinity + Sst_front_dist + Lon,Lat

Deviance explained: 16.32 %

Table E-19. Summary of the best model for bottlenose dolphin in block Aegean.

Family:	Tweedie(p=1.35)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.4193	0.1156	-29.5832	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	1.933	19	0.7413	4e-04
s(pmax(pmin(Depth, 0), -1023.738))	1.076	5	4.7583	0
s(pmax(pmin(Salinity, 39.2709), 34.9956))	3.953	5	6.3444	0
s(pmin(Sst_front_dist, 16.2256))	0.779	5	0.6292	0.0384

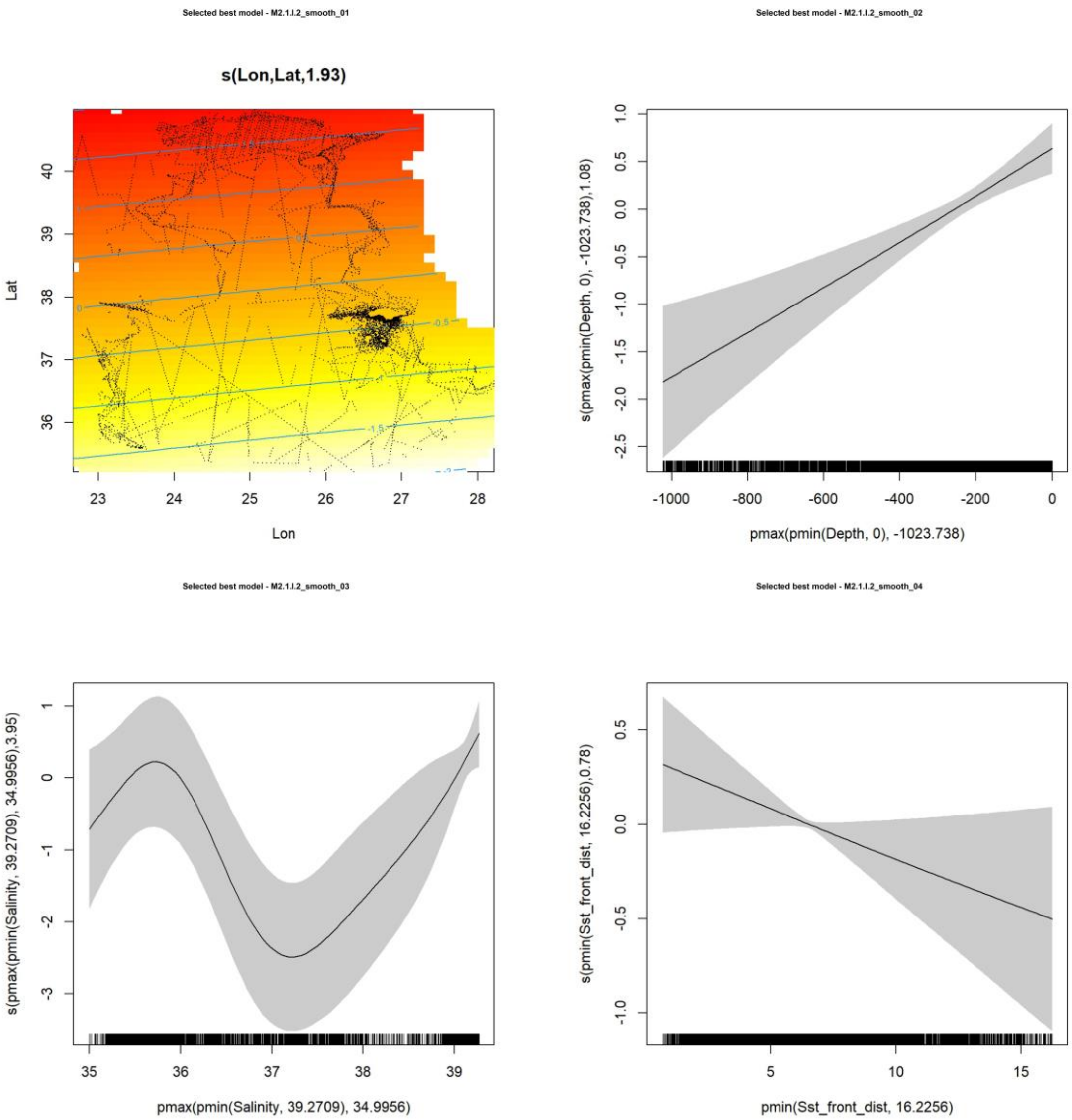


Figure E-19. Smooth plots for the covariates in the spatial model.

2.6.3. Block: Gibraltar - year-round

Number of observations: 324

Number of individuals: 11552.5

Formula: size~te(Lon, Lat, k = covariates.lonlat.k[i], bs = "ts") + offset(log(offset))

Covariates: LonLat15

Deviance explained: 19.97 %

Table E-20. Summary of the best model for bottlenose dolphin in block Gibraltar.

Family:	Tweedie(p=1.517)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.2711	0.1083	-2.5019	0.0124
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
te(Lon,Lat)	22.303	222	0.8084	0

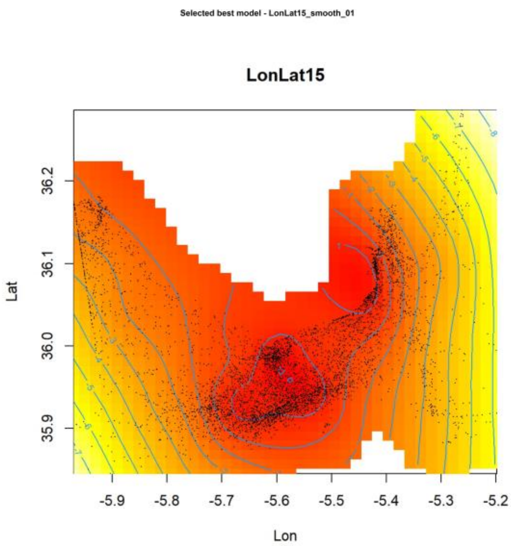


Figure E-20. Smooth plots for the covariates in the spatial model.

2.6.4. Block: Alboran - year-round

Number of observations: 300

Number of individuals: 5856.5

Formula: size~s(pmax(pmin(Depth, -7.94), -2695.955), k = 6, bs = "ts") + s(pmax(pmin(Sst, 25.7738), 14.7555), k = 6, bs = "ts") + s(Sst_front_strength, k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Sst + Sst_front_strength

Deviance explained: 14.91 %

Table E-21. Summary of the best model for bottlenose dolphin in block Alboran.

Family:	Tweedie(p=1.516)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-2.934	0.1052	-27.8874	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Depth, -7.94), -2695.955))	4.597	5	27.797	0
s(pmax(pmin(Sst, 25.7738), 14.7555))	3.138	5	1.6803	0.0311
s(Sst_front_strength)	0.914	5	1.4756	0.0036

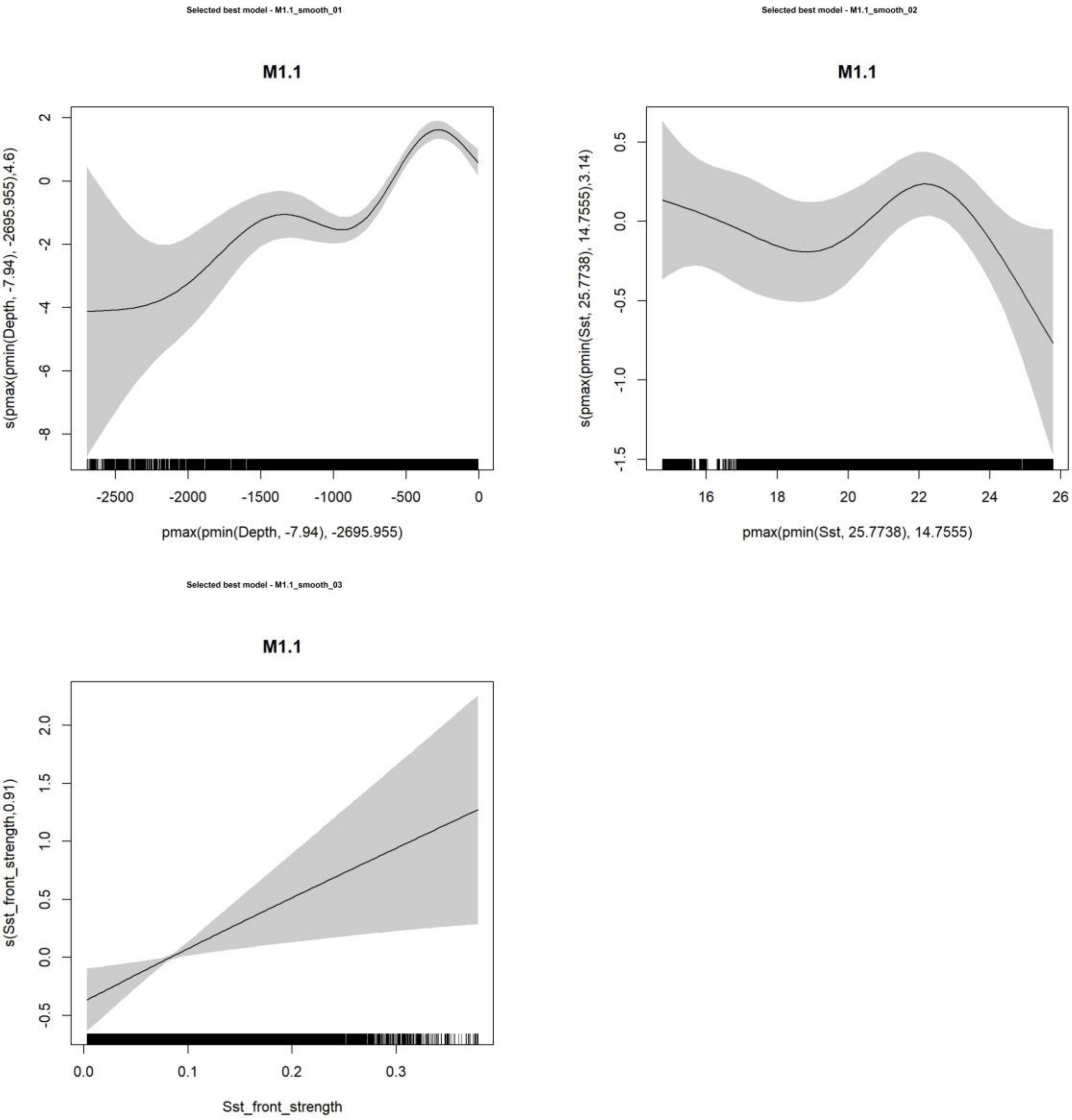


Figure E-21. Smooth plots for the covariates in the spatial model.

2.6.5. Block: Levantine - year-round

Number of observations: 360

Number of individuals: 1747.3

Formula: size~s(pmax(pmin(Depth, -9.286), -4448.654), k = 6, bs = "ts") + s(pmax(pmin(Salinity, 39.4452), 38.6943), k = 6, bs = "ts") + s(pmin(Chl, 0.1143), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + Salinity + Chl

Deviance explained: 35.43 %

Table E-22. Summary of the best model for bottlenose dolphin in block Levantine.

Family:	Tweedie(p=1.398)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.5342	0.1094	-32.3163	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Depth, -9.286), -4448.654))	3.491	5	20.7581	0
s(pmax(pmin(Salinity, 39.4452), 38.6943))	2.573	5	3.5012	1e-04
s(pmin(Chl, 0.1143))	2.393	5	5.1396	0

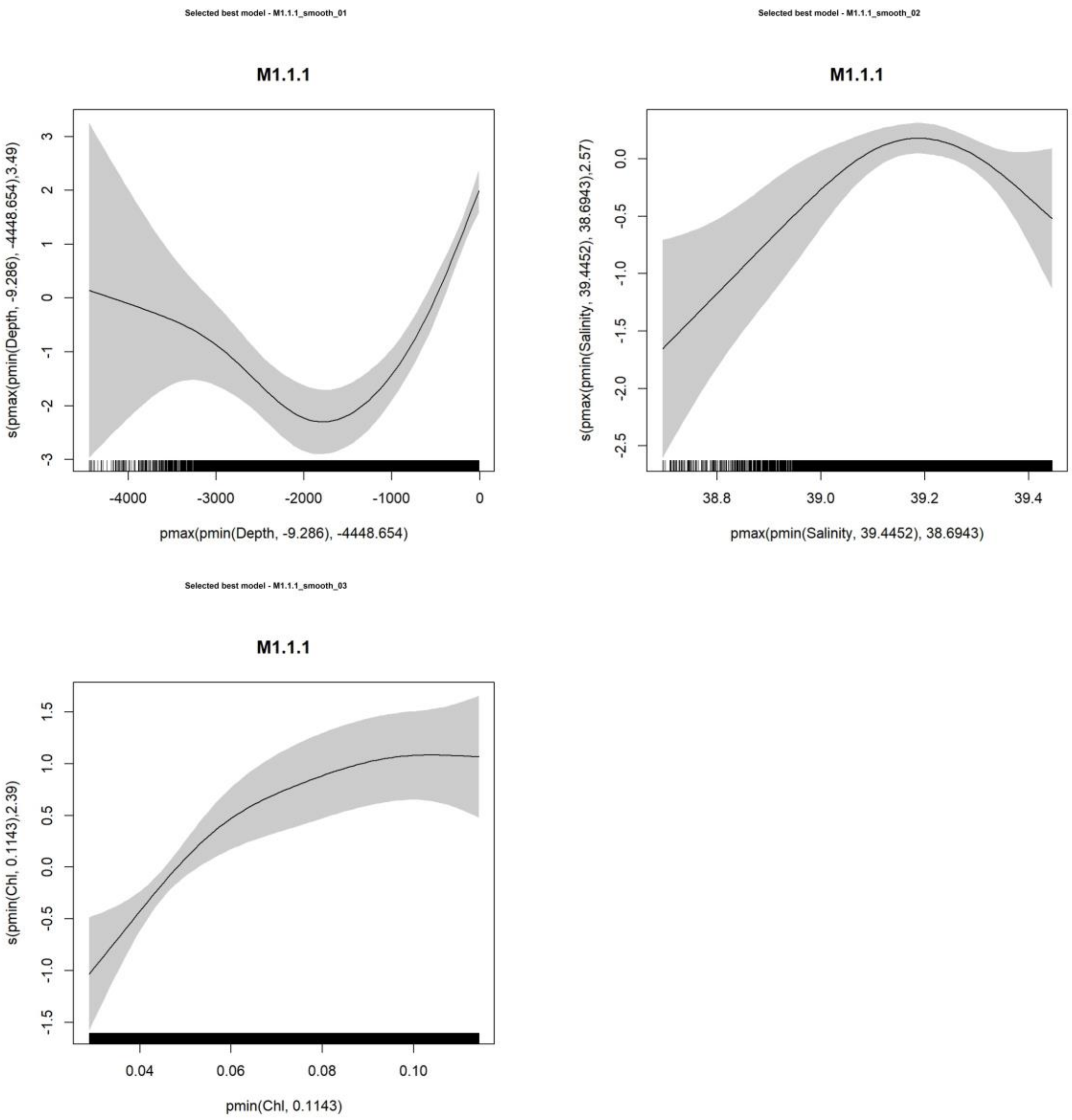


Figure E-22. Smooth plots for the covariates in the spatial model.

2.6.6. Block: Ionian - year-round

Number of observations: 269

Number of individuals: 1791

Formula: size~s(pmax(pmin(Salinity, 39.2218), 37.2597), k = 6, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + offset(log(offset))

Covariates: Salinity + Depth

Deviance explained: 16.1 %

Table E-23. Summary of the best model for bottlenose dolphin in block Ionian.

Family:	Tweedie(p=1.518)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.1585	0.3256	-15.8414	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Salinity, 39.2218), 37.2597))	0.993	5	2.9463	1e-04
s(pmin(Depth, 0))	2.783	5	11.0038	0

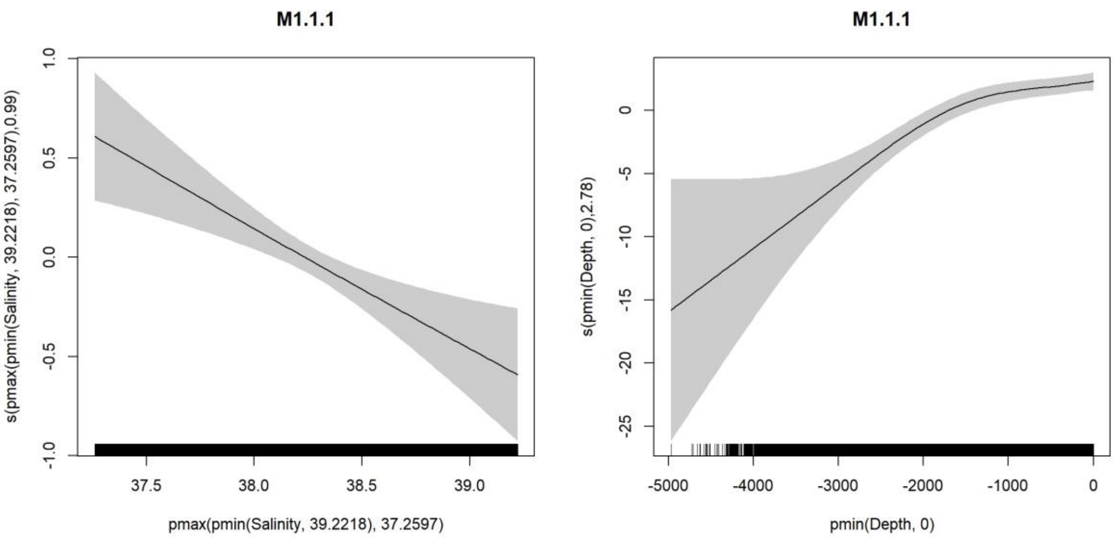


Figure E-23. Smooth plots for the covariates in the spatial model.

2.6.7. Block: WMed_noAlboran - year-round

Number of observations: 3430

Number of individuals: 24637

Formula: size~s(pmax(pmin(Depth, 0), -3632.181), k = 6, bs = "ts") + s(pmax(pmin(Lon, 15.2812), -1.05), k = 10, bs = "ts") + offset(log(offset))

Covariates: Depth + Lon

Deviance explained: 38.4 %

Table E-24. Summary of the best model for bottlenose dolphin in block WMed_noAlboran.

Family:	Tweedie(p=1.383)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-4.2381	0.04	-105.963	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Depth, 0), -3632.181))	4.893	5	391.6606	0
s(pmax(pmin(Lon, 15.2812), -1.05))	8.857	9	127.4946	0

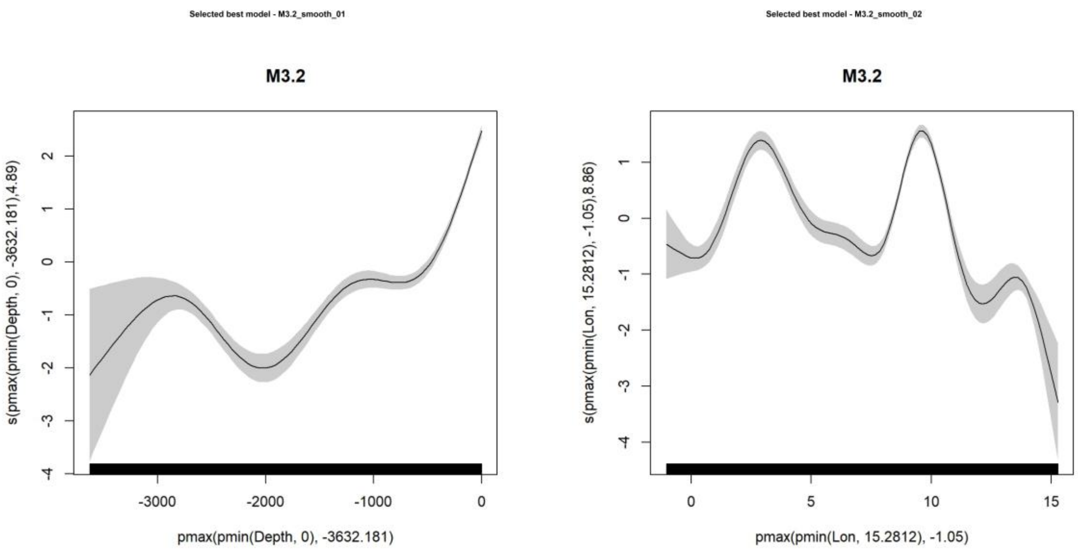


Figure E-24. Smooth plots for the covariates in the spatial model.

2.7. Common dolphin

2.7.1. Block: Gibraltar - year-round

Number of observations: 266

Number of individuals: 12201.5

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(pmin(DistEsc, 33753.216), k = 6, bs = "ts") + s(pmin(DistLand, 13147.1912), k = 2, bs = "ts") + s(pmin(SlopePct, 9.6181), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistEsc + DistLand + SlopePct + Lon,Lat

Deviance explained: 20.75 %

Table E-25. Summary of the best model for common dolphin in block Gibraltar.

Family:	Tweedie(p=1.523)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.2187	0.1056	2.0712	0.0384
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	10.995	19	2.2814	0
s(pmin(DistEsc, 33753.216))	1.003	5	1.3517	0
s(pmin(DistLand, 13147.1912))	1.016	2	2.5138	0.0019
s(pmin(SlopePct, 9.6181))	0.923	5	1.1035	0.0017

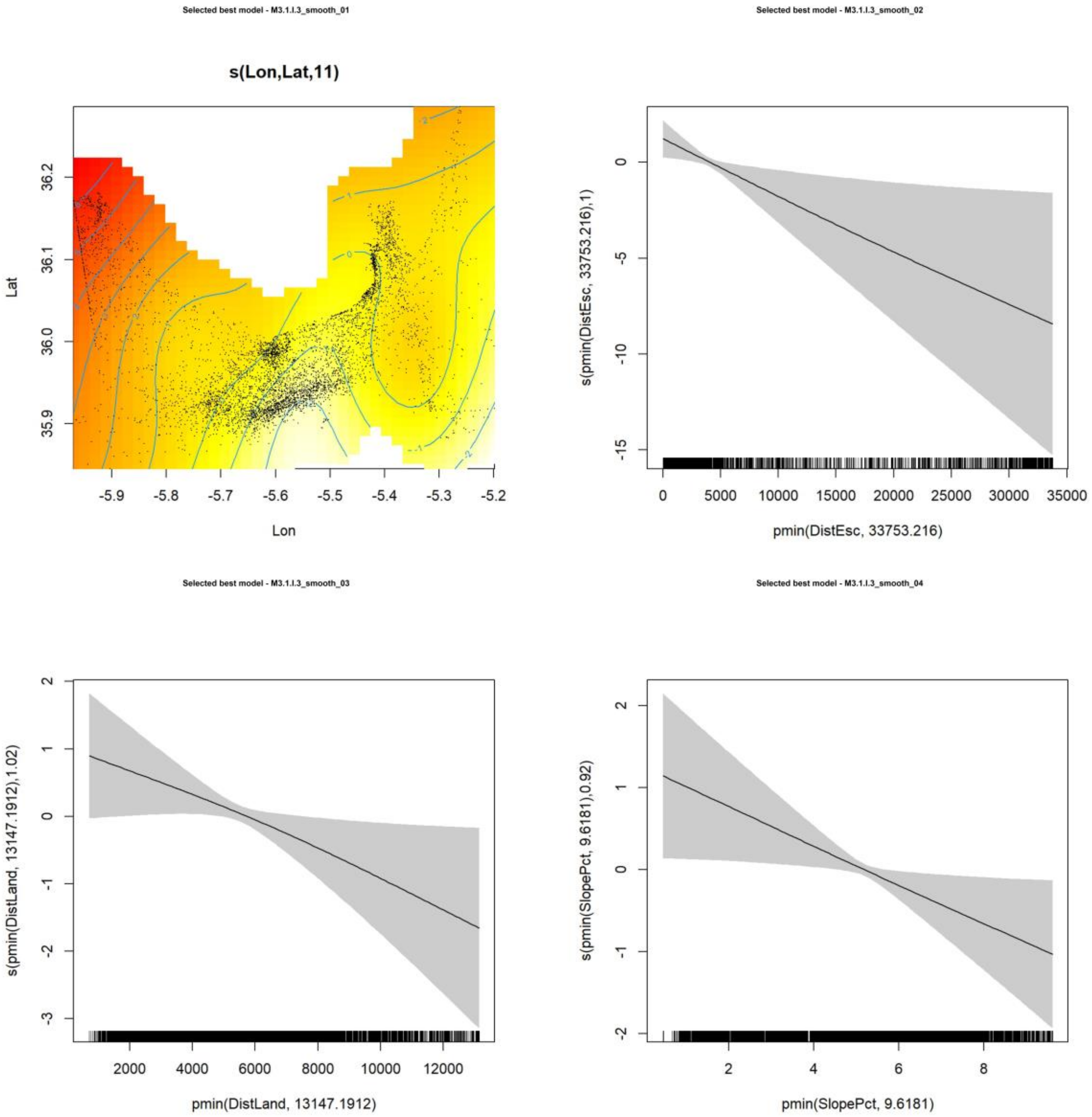


Figure E-25. Smooth plots for the covariates in the spatial model.

2.7.2. Block: Alboran - summer

Number of observations: 667

Number of individuals: 41997.5

Formula: size~te(Lon, Lat, k = covariates.lonlat.k[i], bs = "ts") + offset(log(offset))

Covariates: LonLat20

Deviance explained: 20.32 %

Table E-26. Summary of the best model for common dolphin in block Alboran.

Family:	Tweedie(p=1.621)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.7942	0.0853	-9.3104	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
te(Lon,Lat)	66.53	386	1.0223	0

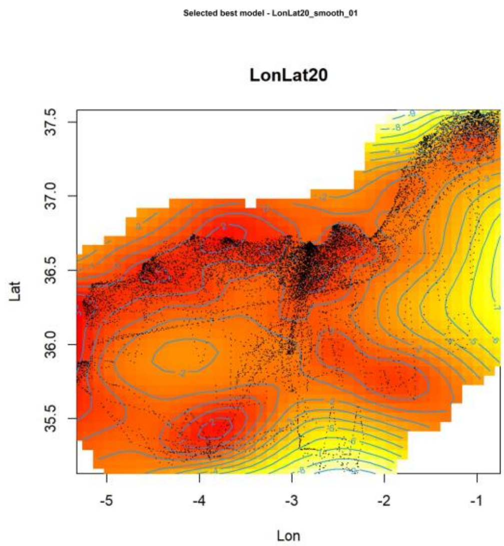


Figure E-26. Smooth plots for the covariates in the spatial model.

2.7.3. Block: Alboran - winter

Number of observations: 114

Number of individuals: 3952.5

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(pmax(pmin(Depth, -4.5177), -2678.5), k = 6, bs = "ts") + s(pmin(DistSlope, 8081.1391), k = 2, bs = "ts") + s(pmin(Sst_front_strength, 0.235), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + DistSlope + Sst_front_strength + Lon,Lat

Deviance explained: 8.92 %

Table E-27. Summary of the best model for common dolphin in block Alboran.

Family:	Tweedie(p=1.61)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-1.2218	0.1632	-7.4855	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	1.312	19	0.3671	0.0061
s(pmax(pmin(Depth, -4.5177), -2678.5))	0.818	5	0.857	0.0181
s(pmin(DistSlope, 8081.1391))	0.781	2	1.5362	0.04
s(pmin(Sst_front_strength, 0.235))	2.19	5	1.544	0.0123

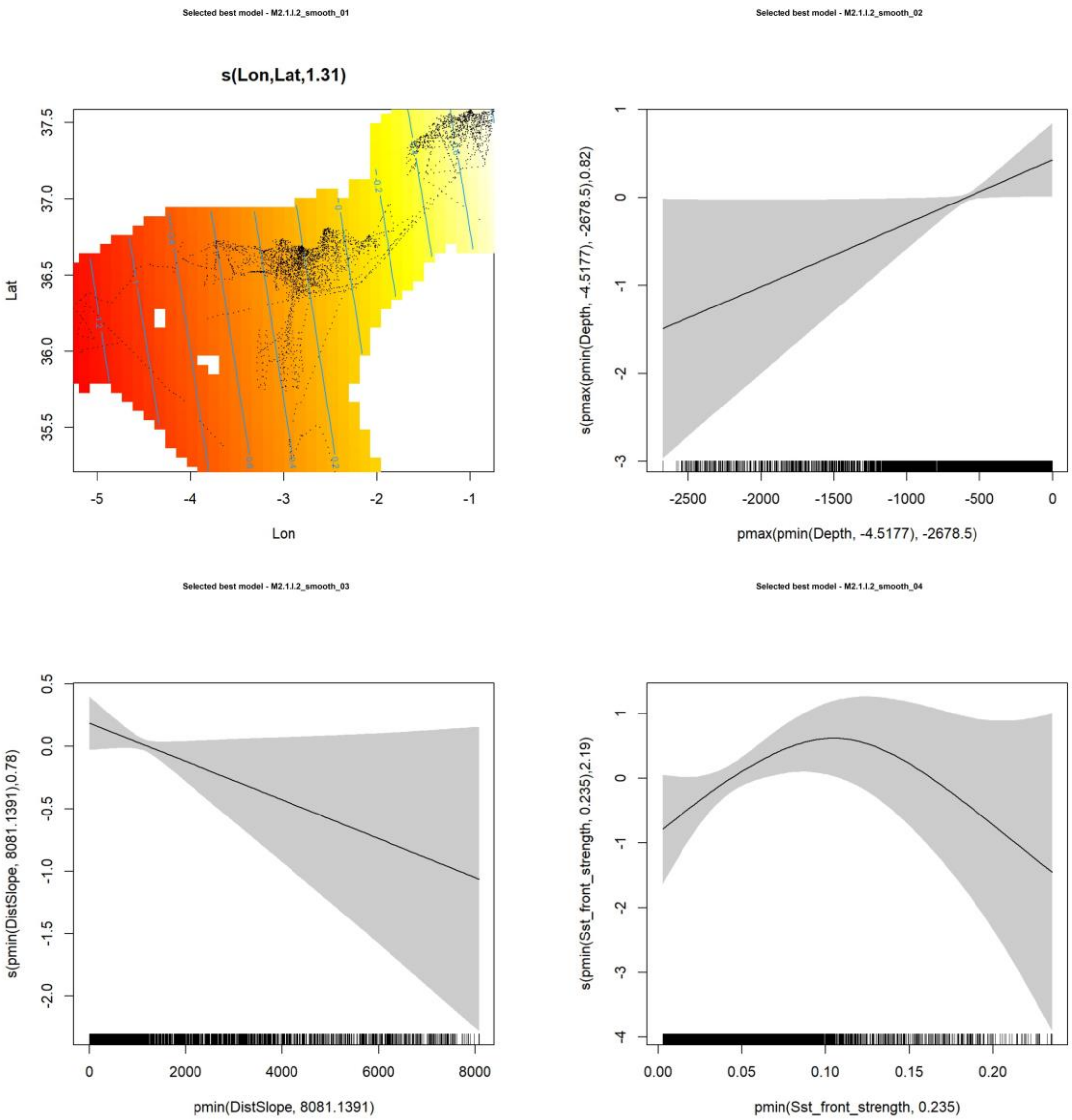


Figure E-27. Smooth plots for the covariates in the spatial model.

2.7.4. Block: noAlboran - summer

Number of observations: 524

Number of individuals: 9007.1

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(DistToAtl, k = 6, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + s(pmin(Sst_front_dist, 22.9435), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistToAtl + Depth + Sst_front_dist + Lon,Lat

Deviance explained: 28.52 %

Table E-28. Summary of the best model for common dolphin in block noAlboran.

Family:	Tweedie(p=1.482)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.2595	0.0889	-59.1681	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	16.94	19	14.6592	0
s(DistToAtl)	3.843	5	9.5137	0
s(pmin(Depth, 0))	3.593	5	14.1752	0
s(pmin(Sst_front_dist, 22.9435))	1.559	5	3.8135	0

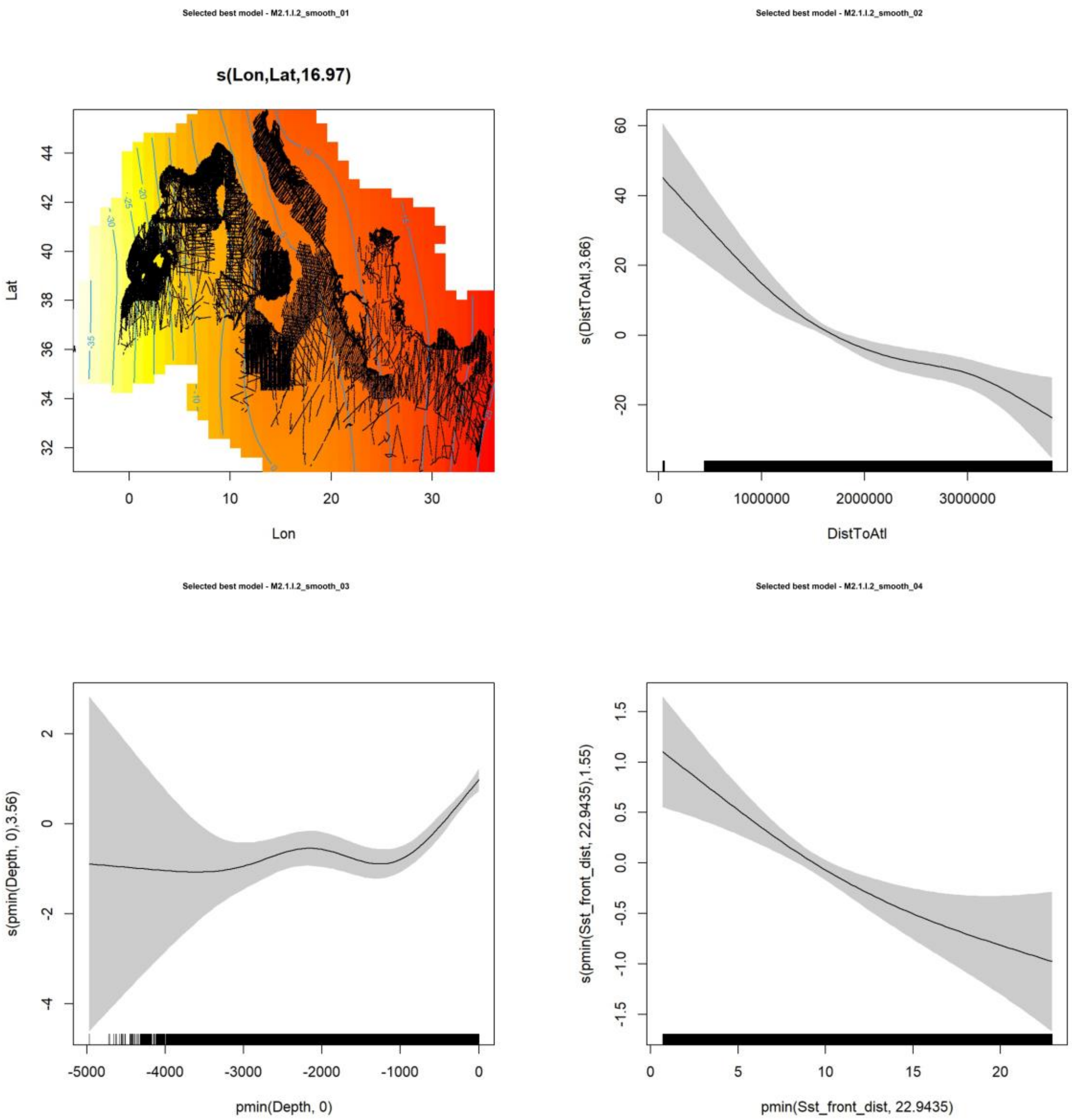


Figure E-28. Smooth plots for the covariates in the spatial model.

2.7.5. Block: noAlboran - winter

Number of observations: 90

Number of individuals: 1709.4

Formula: size~s(Lon, Lat, k = 20, bs = "ts") + s(pmin(DistShelf, 165122.757), k = 2, bs = "ts") + s(pmin(Primary_prod, 26.7097), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistShelf + Primary_prod + Lon,Lat

Deviance explained: 69.09 %

Table E-29. Summary of the best model for common dolphin in block noAlboran.

Family:	Tweedie(p=1.407)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-7.4793	0.423	-17.68	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	16.431	19	19.3736	0
s(pmin(DistShelf, 165122.757))	0.888	2	2.5504	0.0111
s(pmin(Primary_prod, 26.7097))	2.446	5	2.5714	0.0012

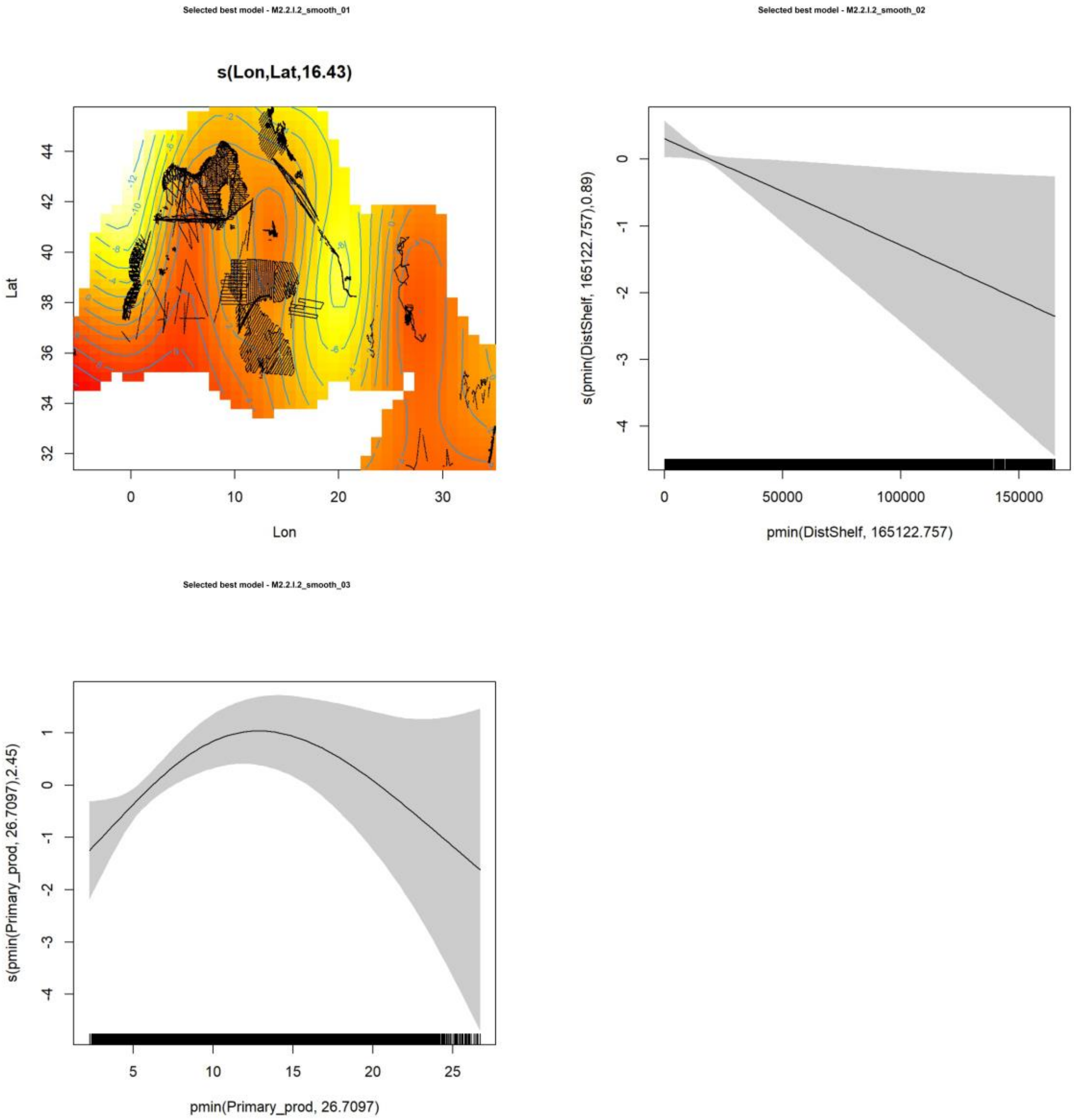


Figure E-29. Smooth plots for the covariates in the spatial model.

2.8. Striped dolphin

2.8.1. Block: Gibraltar - year-round

Number of observations: 291

Number of individuals: 25481

Formula: size~s(pmin(DistLand, 13148.5536), k = 2, bs = "ts") + s(pmin(DistSlope, 14005.0308), k = 2, bs = "ts") + s(pmin(SlopePct, 9.6203), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistLand + DistSlope + SlopePct

Deviance explained: 7.91 %

Table E-30. Summary of the best model for striped dolphin in block Gibraltar.

Family:	Tweedie(p=1.642)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.7915	0.1107	7.1491	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmin(DistLand, 13148.5536))	0.92	2	2.8422	0.0088
s(pmin(DistSlope, 14005.0308))	0.949	2	5.0543	4e-04
s(pmin(SlopePct, 9.6203))	2.677	5	2.3721	0.002

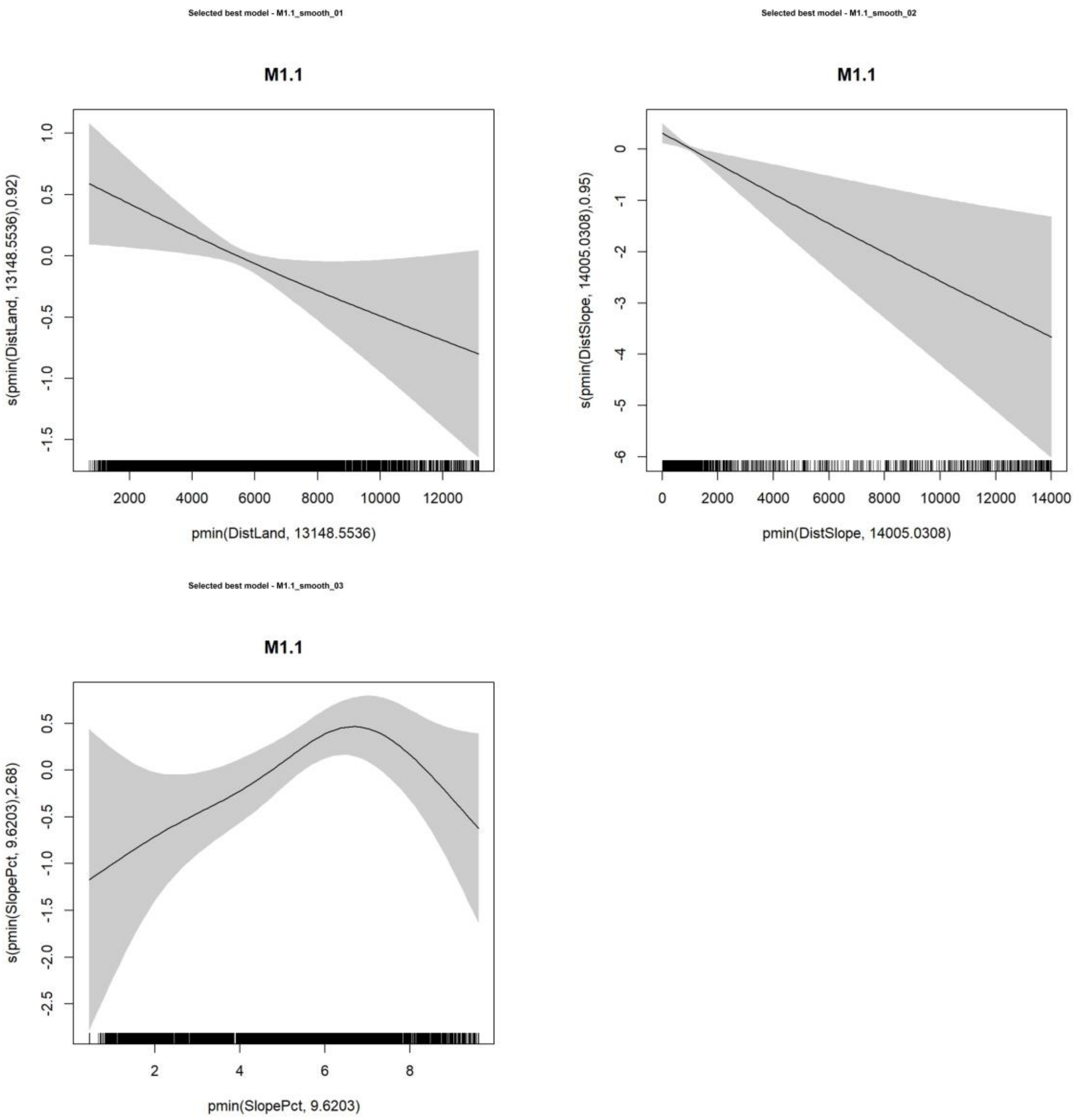


Figure E-30. Smooth plots for the covariates in the spatial model.

2.8.2. Block: noGibraltar - summer

Number of observations: 12394

Number of individuals: 277609.743783333

Formula: size~s(Lon, Lat, k = 15, bs = "ts") + s(DistToAtl, k = 6, bs = "ts") + s(pmax(pmin(Mix_layer_thickness, 29.1781), 11.5128), k = 6, bs = "ts") + s(pmax(pmin(Ssh, -0.2567), -0.5487), k = 6, bs = "ts") + s(pmax(pmin(Sst, 27.627), 18.653), k = 6, bs = "ts") + s(pmin(Depth, 0), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistToAtl + Mix_layer_thickness + Ssh + Sst + Depth + Lon,Lat

Deviance explained: 17.33 %

Table E-31. Summary of the best model for striped dolphin in block noGibraltar.

Family:	Tweedie(p=1.545)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-2.1349	0.031	-68.839	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(Lon,Lat)	13.381	14	106.3309	0
s(DistToAtl)	4.706	5	64.652	0
s(pmax(pmin(Mix_layer_thickness, 29.1781), 11.5128))	3.546	5	3.2436	9e-04
s(pmax(pmin(Ssh, -0.2567), -0.5487))	3.052	5	4.6251	0
s(pmax(pmin(Sst, 27.627), 18.653))	4.614	5	14.2642	0
s(pmin(Depth, 0))	4.301	5	34.3675	0

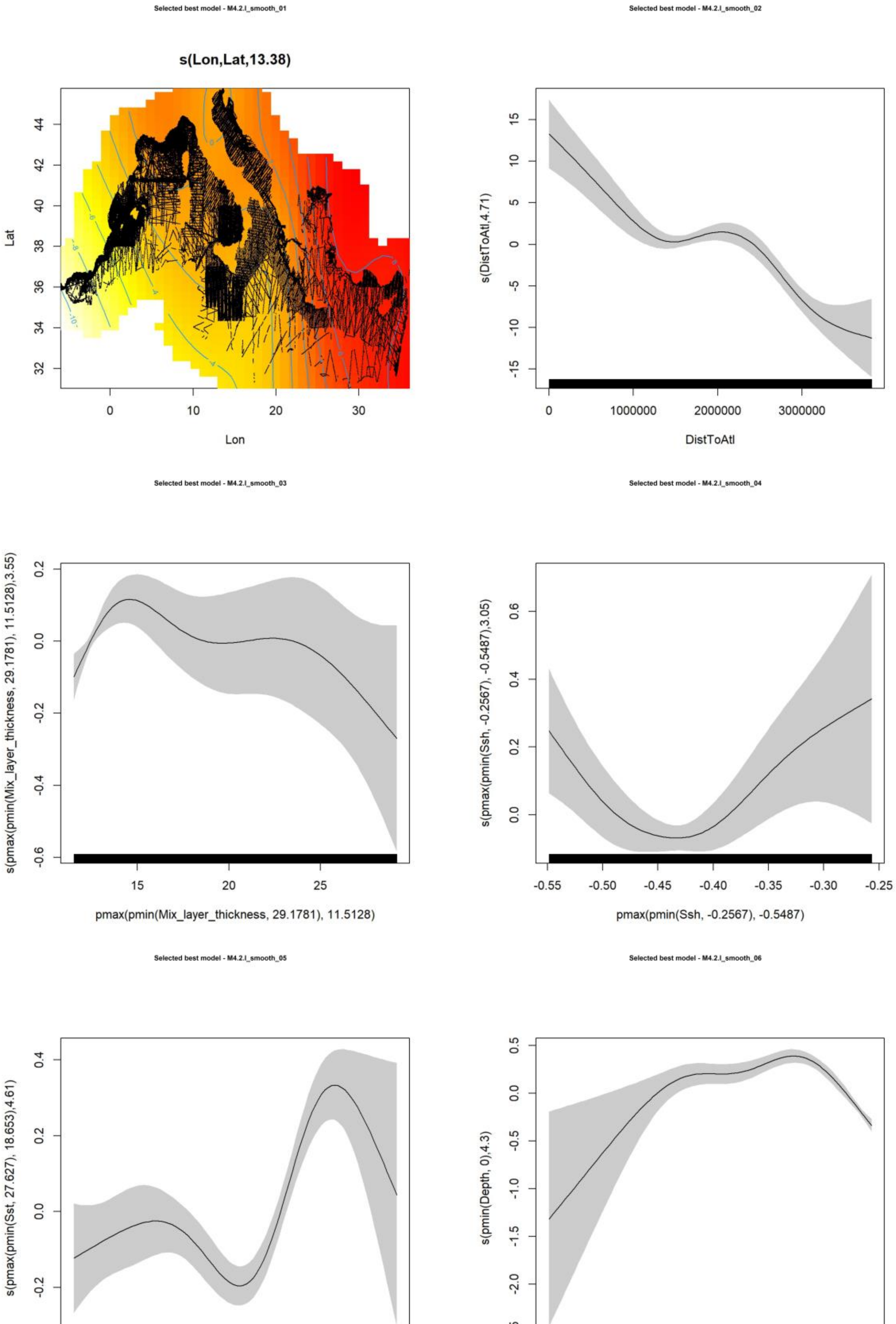


Figure E-31. Smooth plots for the covariates in the spatial model.

2.8.3. Block: noGibraltar - winter

Number of observations: 1807

Number of individuals: 26275

Formula: size~s(DistToAtl, k = 6, bs = "ts") + s(pmax(pmin(Depth, 0), -3620.319), k = 6, bs = "ts") + s(pmax(pmin(Sst, 19.63), 10.964), k = 6, bs = "ts") + offset(log(offset))

Covariates: DistToAtl + Depth + Sst

Deviance explained: 20.2 %

Table E-32. Summary of the best model for striped dolphin in block noGibraltar.

Family:	Tweedie(p=1.574)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-2.6007	0.0715	-36.3728	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(DistToAtl)	4.477	5	69.5549	0
s(pmax(pmin(Depth, 0), -3620.319))	4.058	5	17.9484	0
s(pmax(pmin(Sst, 19.63), 10.964))	4.265	5	9.7655	0

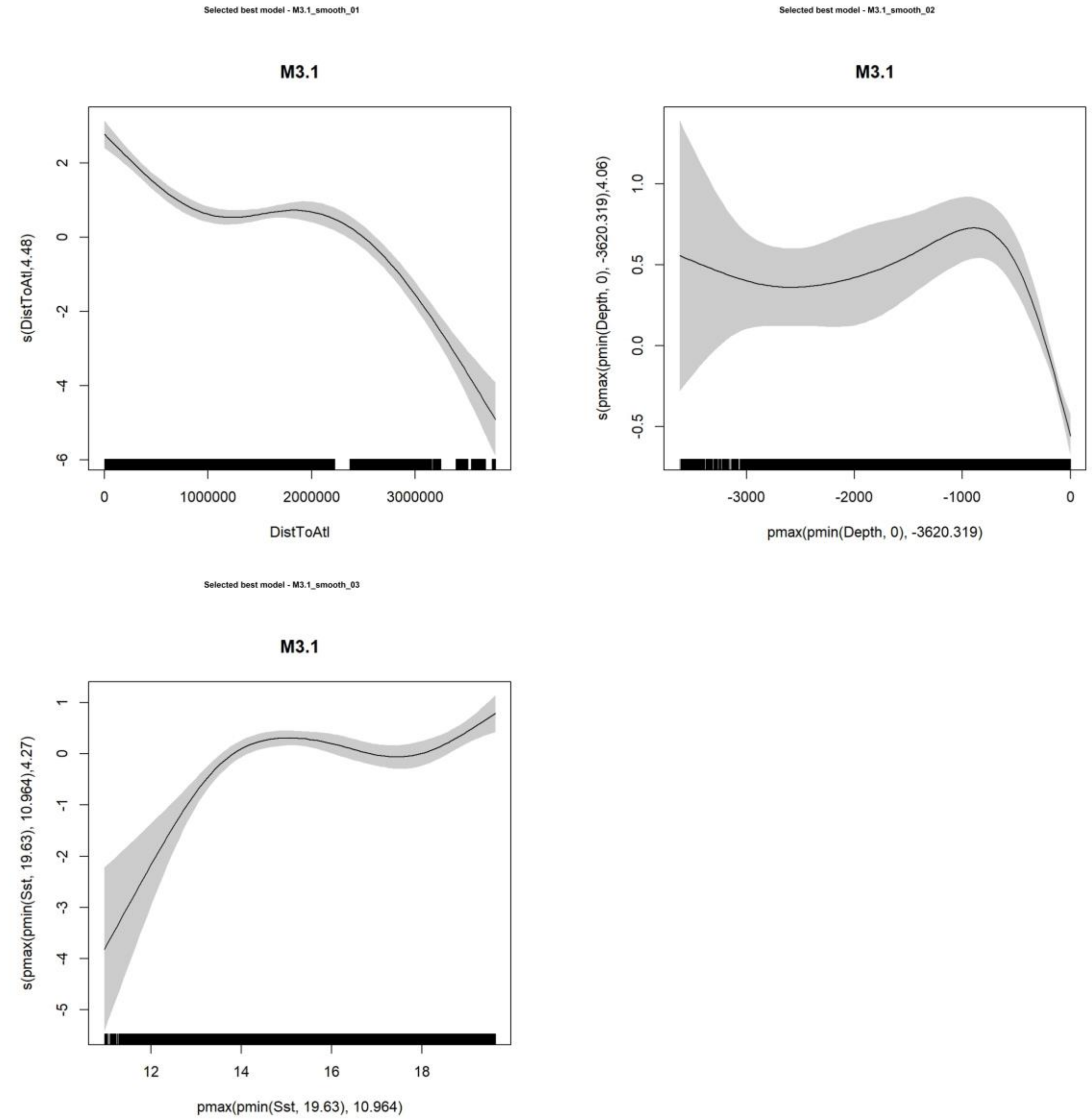


Figure E-32. Smooth plots for the covariates in the spatial model.

2.9. Harbor porpoise

2.9.1. Block: Aegean - summer

Number of observations: 16

Number of individuals: 29

Formula: size~s(pmax(pmin(DistToAtl, 3123602.92), 2640494), k = 5, bs = "ts") + offset(log(offset))

Covariates: DistToAtl

Deviance explained: 72.3 %

Table E-33. Summary of the best model for harbor porpoise in block Aegean.

Family:	Tweedie(p=1.296)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-11.372	2.6923	-4.224	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(DistToAtl, 3123602.92), 2640494))	0.95	4	3.6004	1e-04

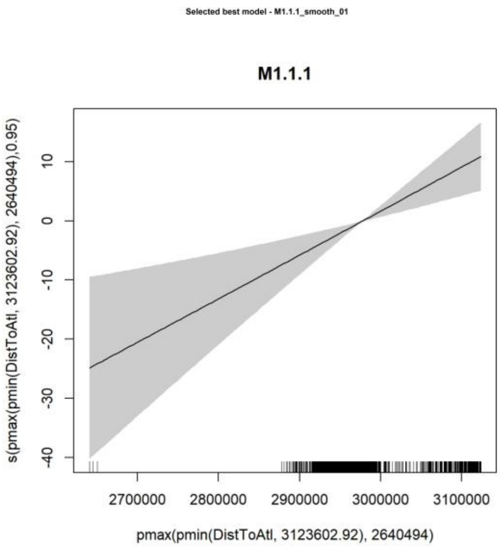


Figure E-33. Smooth plots for the covariates in the spatial model.

2.10. Killer whale

2.10.1. Block: Gibraltar - year-round

Number of observations: 86

Number of individuals: 740

Formula: size~s(pmax(pmin(Depth, 0), -902.558), k = 6, bs = "ts") + s(pmin(DistToAtl, 63090.91), k = 6, bs = "ts") + s(pmin(Primary_prod, 22.8828), k = 6, bs = "ts") + offset(log(offset))

Covariates: Depth + DistToAtl + Primary_prod

Deviance explained: 30.99 %

Table E-34. Summary of the best model for killer whale in block Gibraltar.

Family:	Tweedie(p=1.208)			
Link function:	log			
Parametric coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-4.4911	0.4536	-9.9004	0
Approximate significance of smooth terms:				
Terms	edf	Ref.df	F	p-value
s(pmax(pmin(Depth, 0), -902.558))	2.983	5	6.7907	0
s(pmin(DistToAtl, 63090.91))	3.897	5	10.1374	0
s(pmin(Primary_prod, 22.8828))	0.941	5	1.3632	0.0029

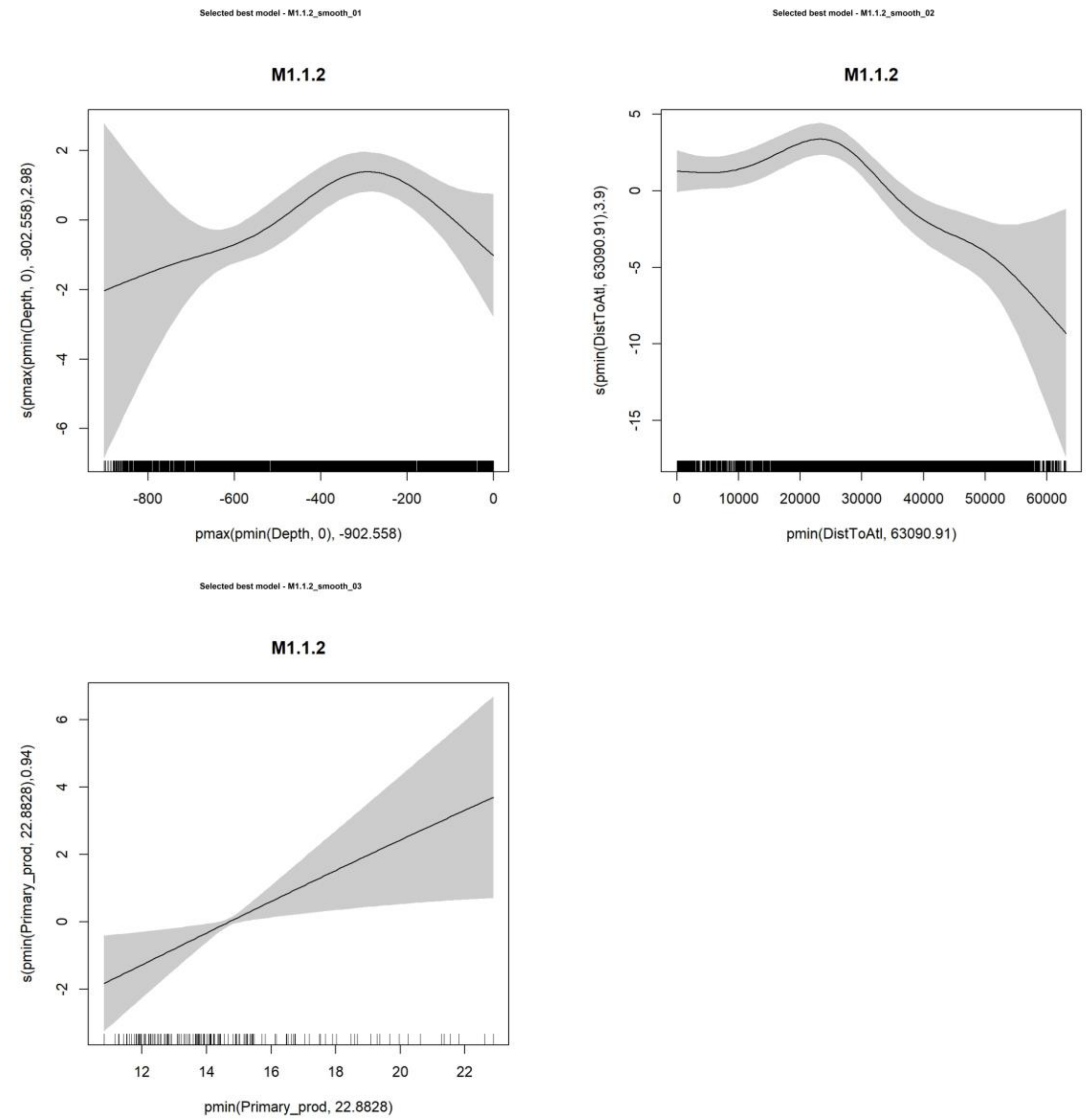


Figure E-34. Smooth plots for the covariates in the spatial model.

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F

Maps of predicted densities and uncertainty

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Appendix F: Maps of predicted densities and uncertainty

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1. Maps of predicted densities for the Black Sea

1.1. Bottlenose dolphin

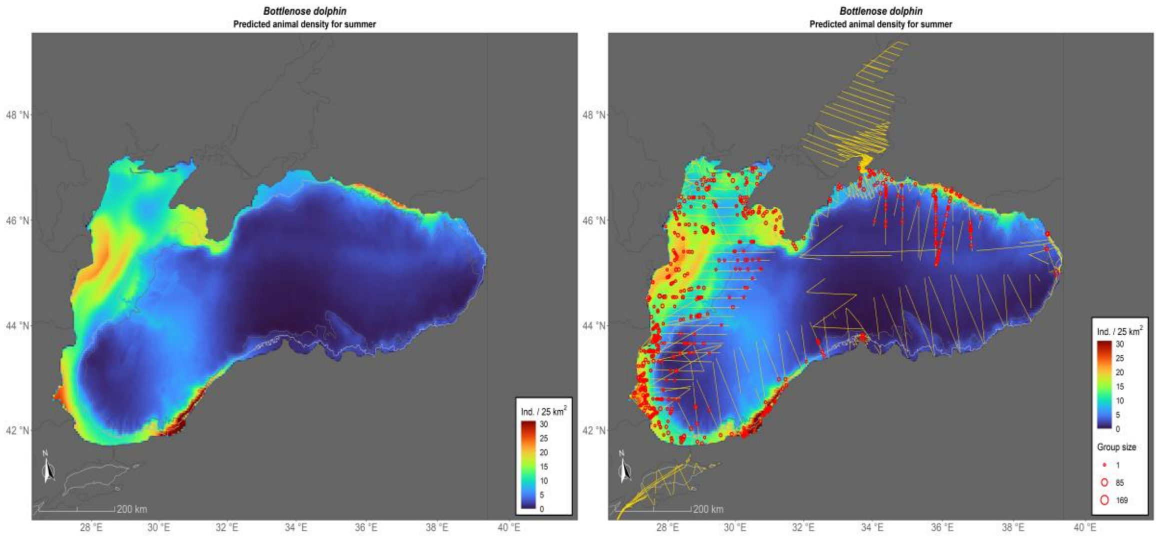

Figure F-1. Map of predicted densities in summer for bottlenose dolphin (left) and with tracks and observations (right).

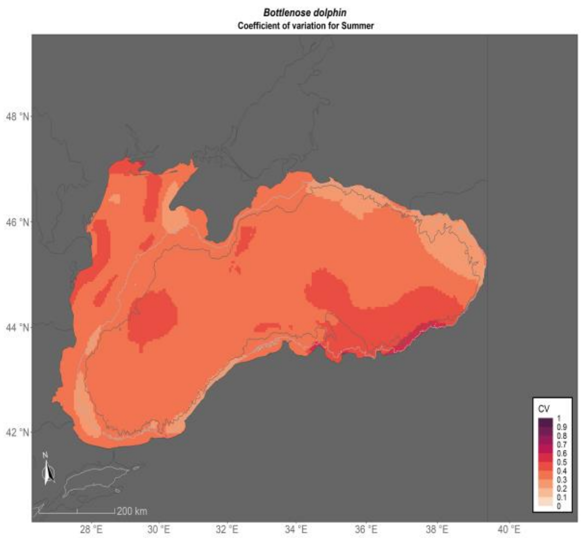

Figure F-2. Map of uncertainty (Coefficient of variation) in summer for bottlenose dolphin.

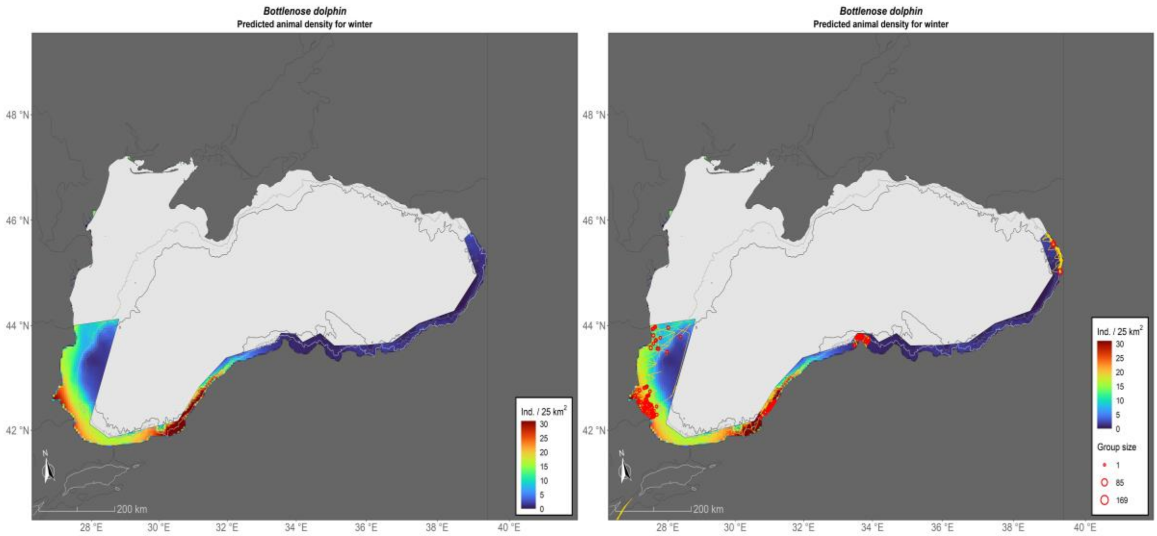

Figure F-3. Map of predicted densities in winter for bottlenose dolphin (left) and with tracks and observations (right).

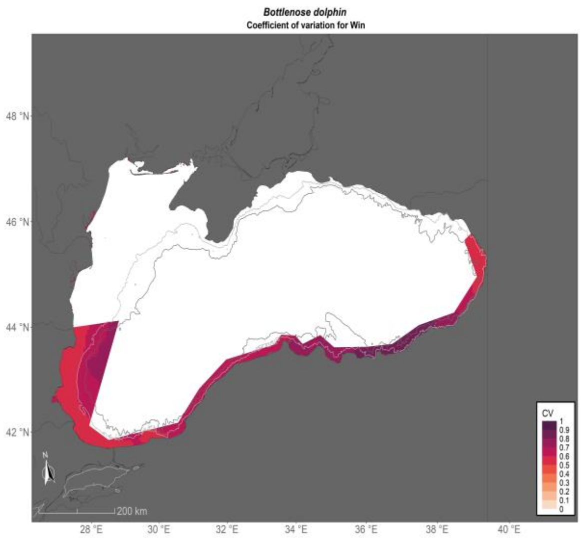

Figure F-4. Map of uncertainty (Coefficient of variation) in winter for bottlenose dolphin.

1.2. Common dolphin

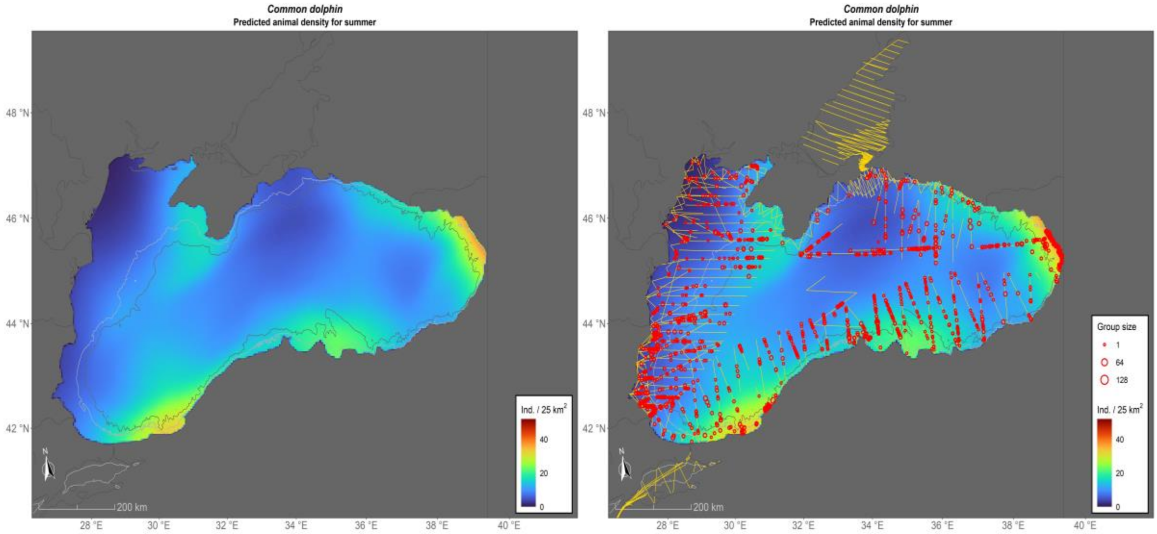

Figure F-5. Map of predicted densities in summer for common dolphin (left) and with tracks and observations (right).

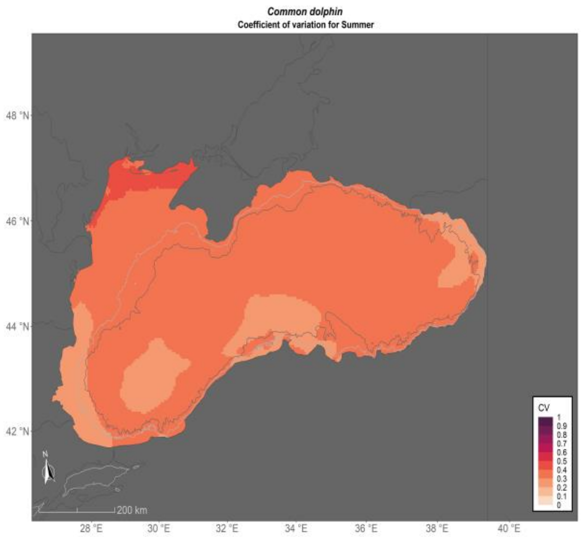

Figure F-6. Map of uncertainty (Coefficient of variation) in summer for common dolphin.

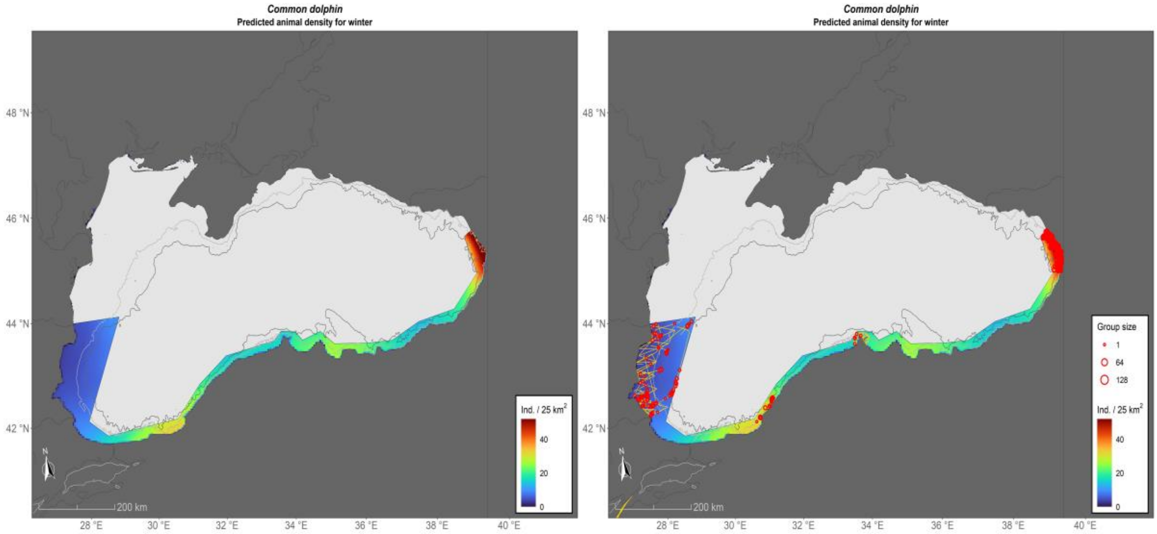

Figure F-7. Map of predicted densities in winter for common dolphin (left) and with tracks and observations (right).

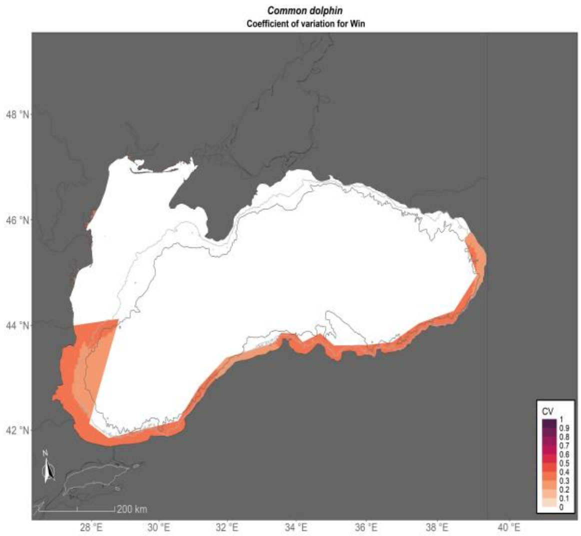

Figure F-8. Map of uncertainty (Coefficient of variation) in winter for common dolphin.

1.3. Harbor porpoise

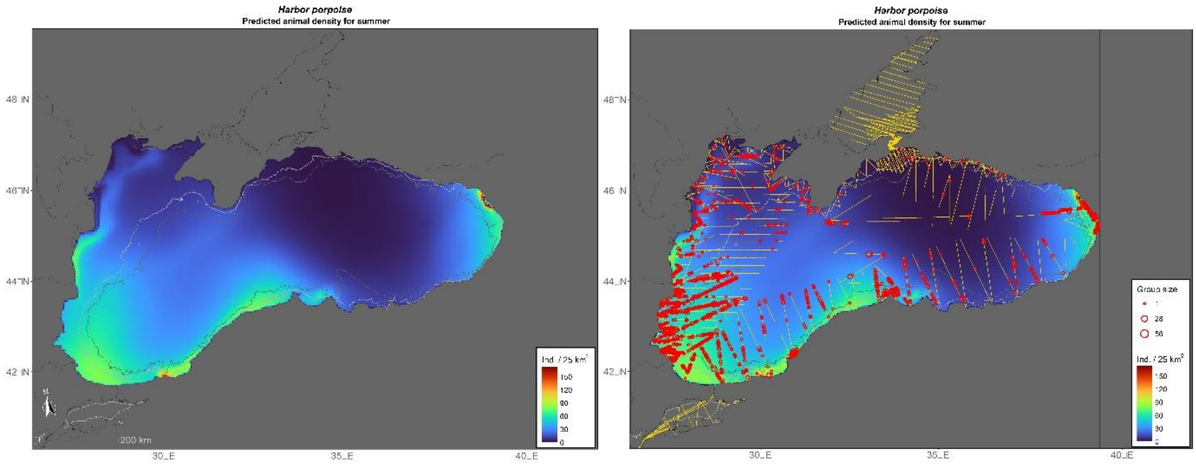

Figure F-9. Map of predicted densities in summer for harbor porpoise (left) and with tracks and observations (right).

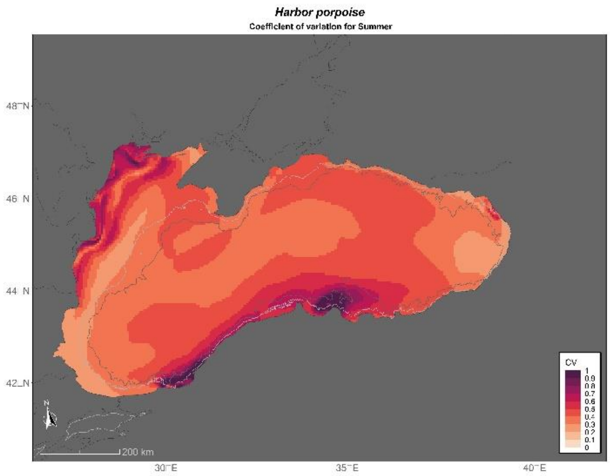

Figure F-10. Map of uncertainty (Coefficient of variation) in summer for harbor porpoise.

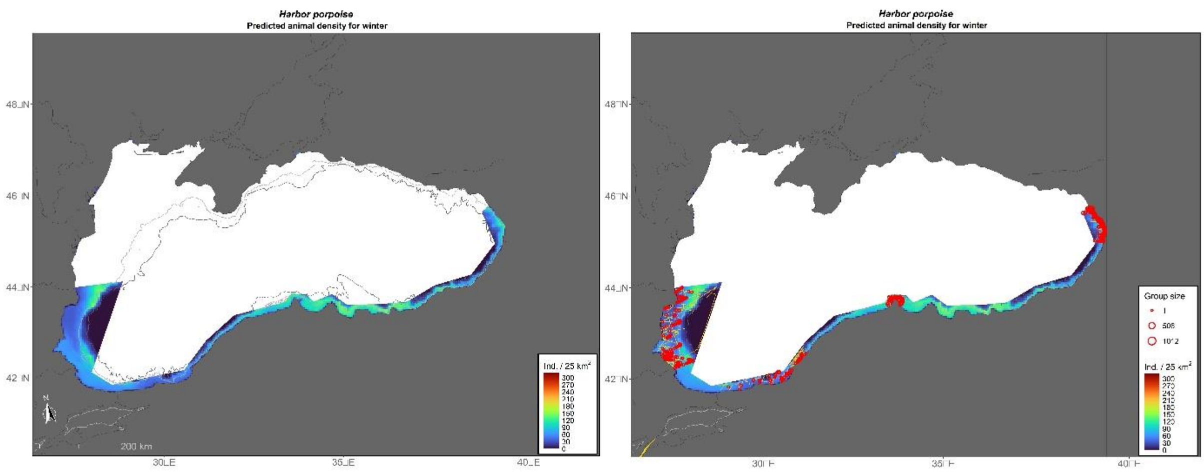

Figure F-11. Map of predicted densities in winter for harbor porpoise (left) and with tracks and observations (right).

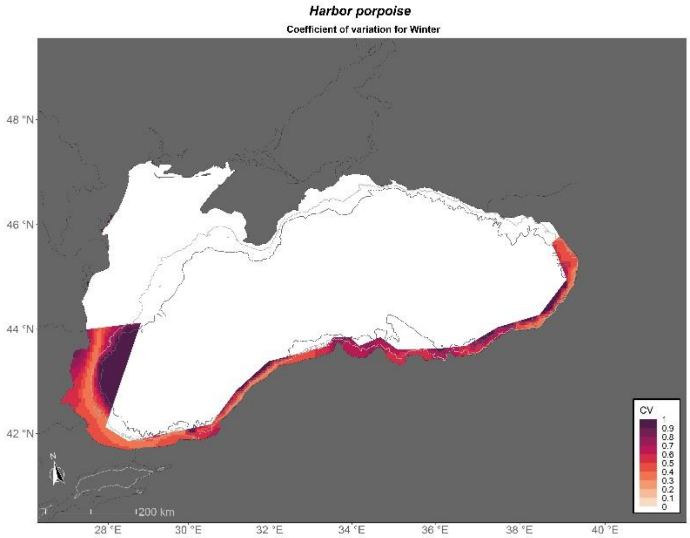

Figure F-12. Map of uncertainty (Coefficient of variation) in winter for harbor porpoise.

2. Maps of predicted densities for the Azov Sea

2.1. Bottlenose dolphin

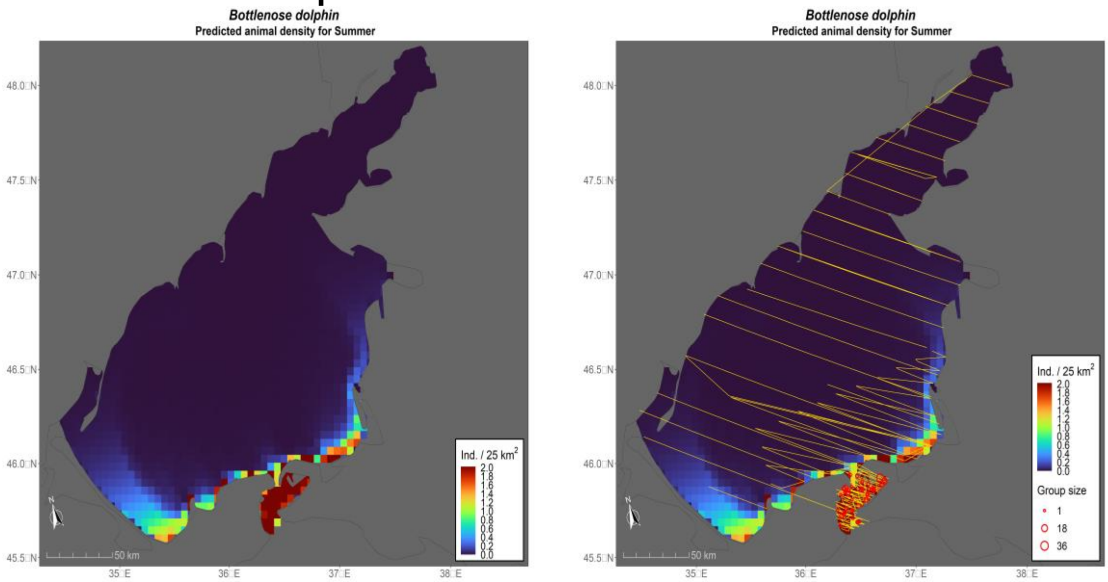

Figure F-13. Map of predicted densities in summer for bottlenose dolphin (left) and with tracks and observations (right).

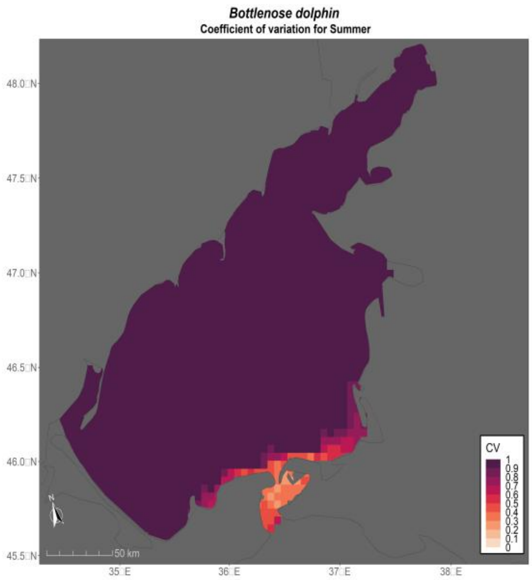

Figure F-14. Map of uncertainty (Coefficient of variation) in summer for bottlenose dolphin.

2.2. Harbor porpoise

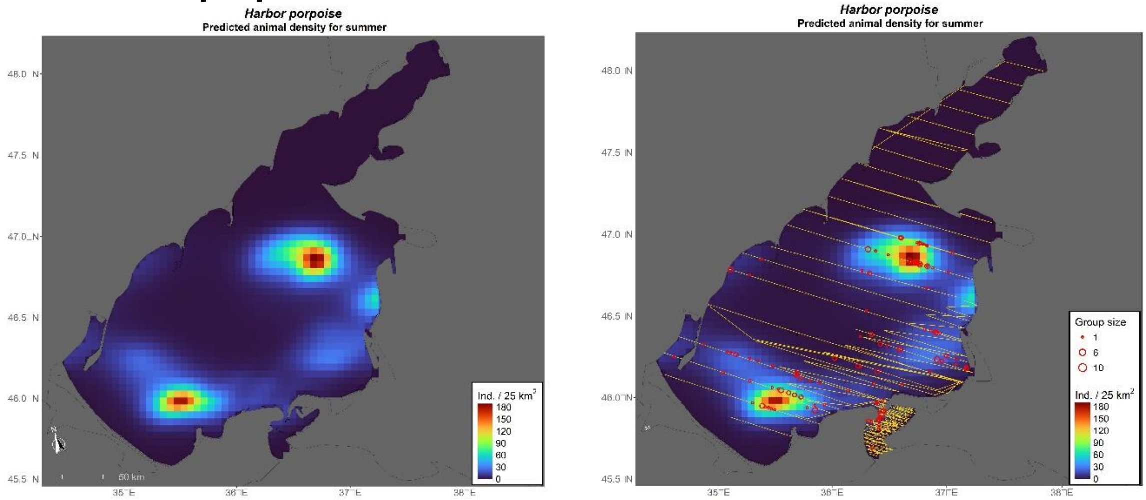

Figure F-15. Map of predicted densities in summer for harbor porpoise (left) and with tracks and observations (right).

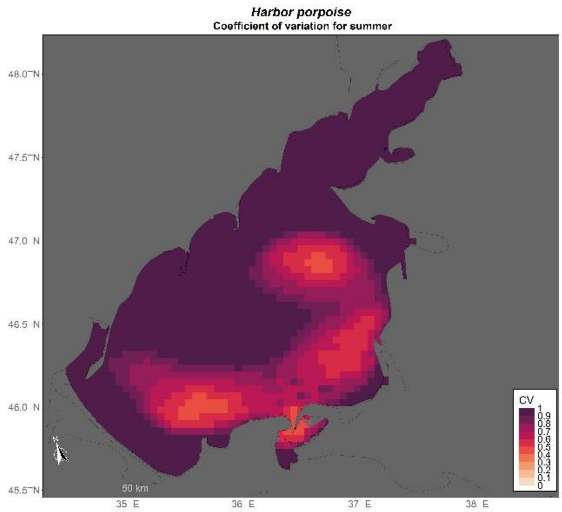

Figure F-16. Map of uncertainty (Coefficient of variation) in summer for harbor porpoise.

3. Maps of predicted densities for the Mediterranean Sea

3.1. Fin whale

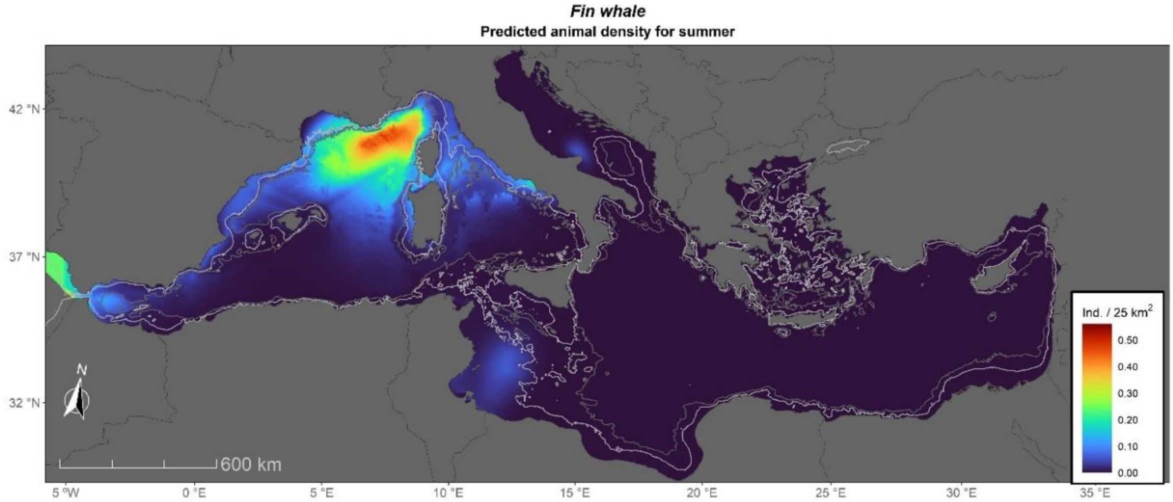

Figure F-17. Map of predicted densities in summer for fin whale.

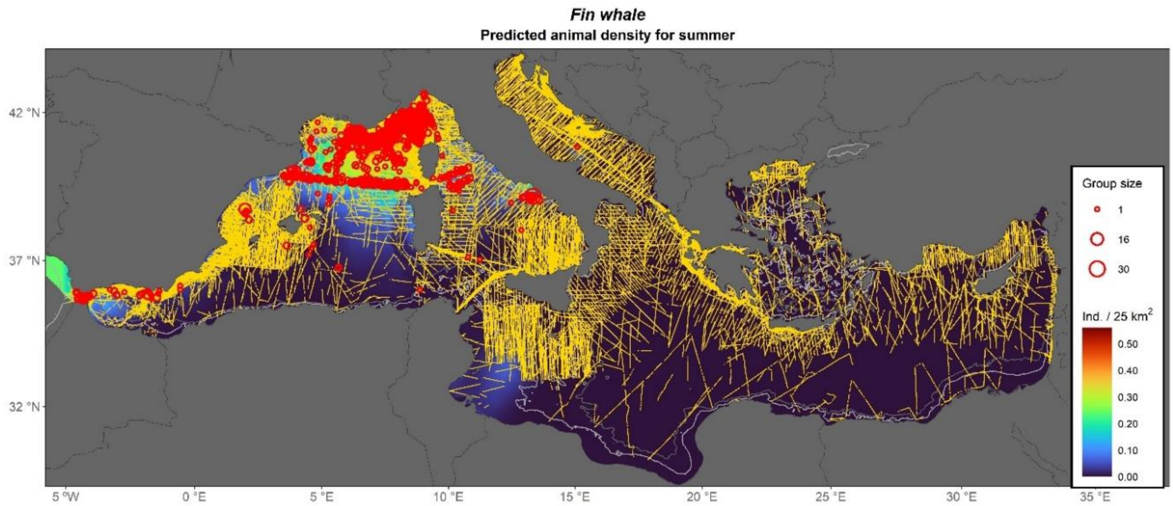

Figure F-18. Map of predicted densities in summer for fin whale with tracks and observations.

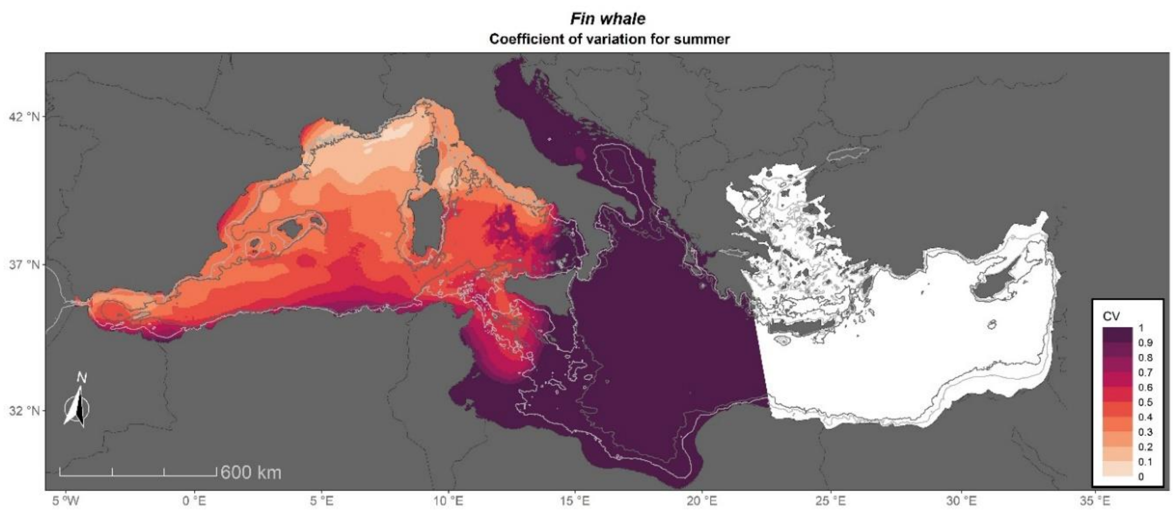

Figure F-19. Map of uncertainty (Coefficient of variation) in summer for fin whale.

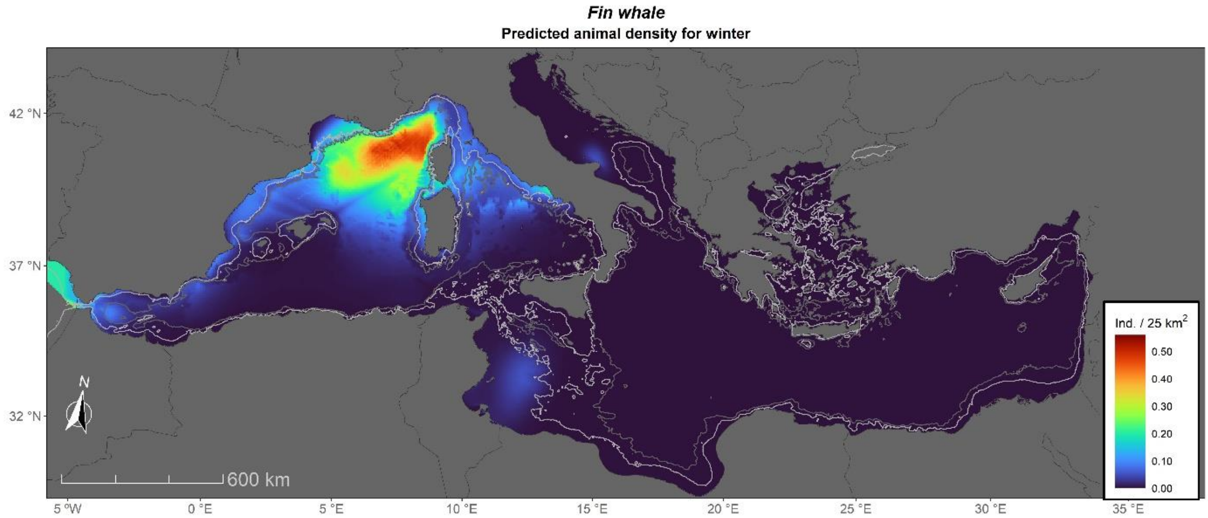

Figure F-20. Map of predicted densities in winter for fin whale.

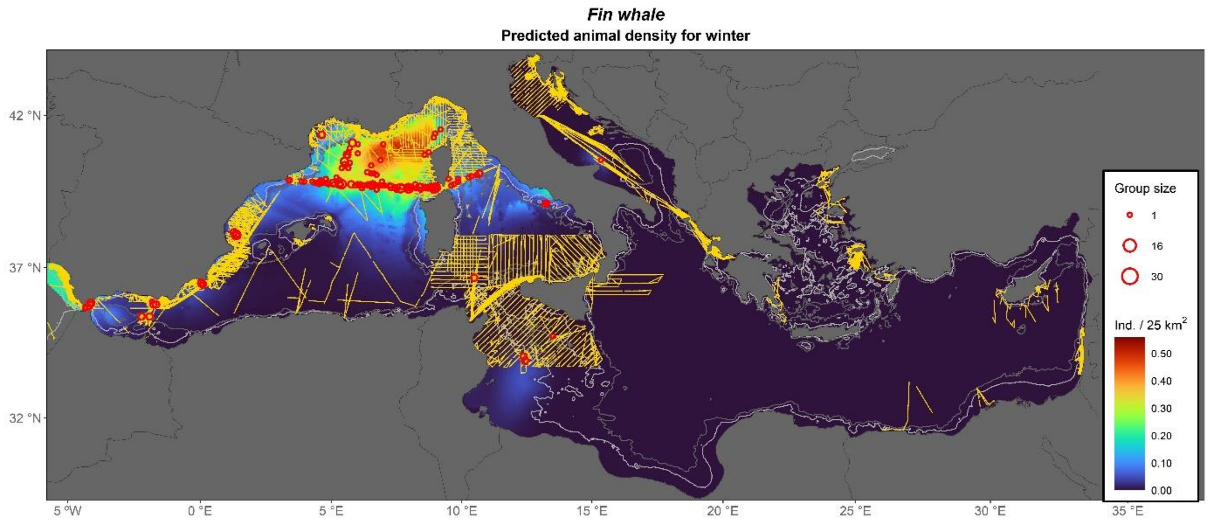

Figure F-21. Map of predicted densities in winter for fin whale with tracks and observations.

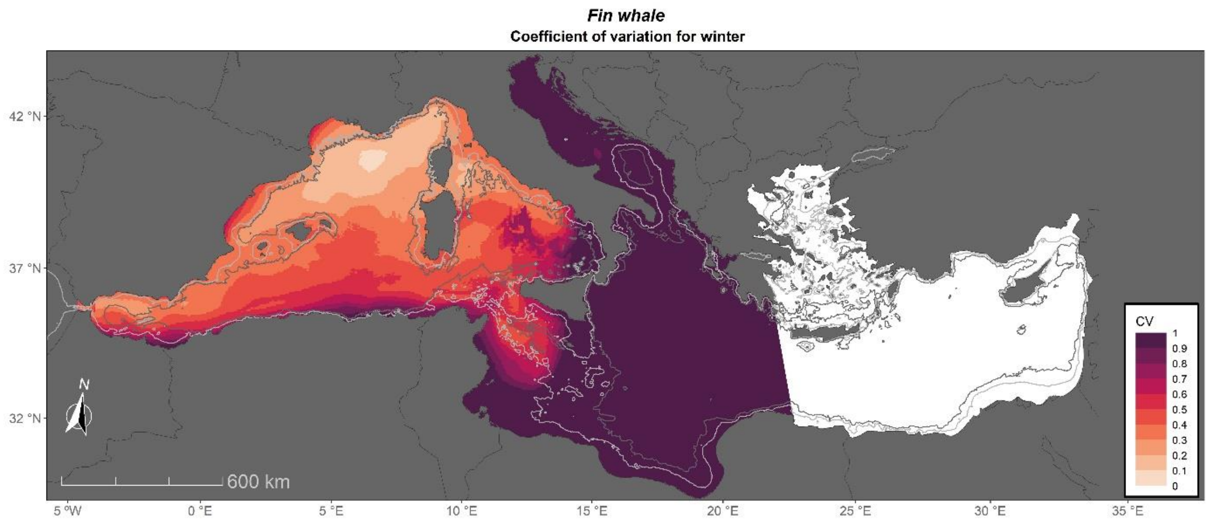

Figure F-22. Map of uncertainty (Coefficient of variation) in winter for fin whale.

3.2. Sperm whale

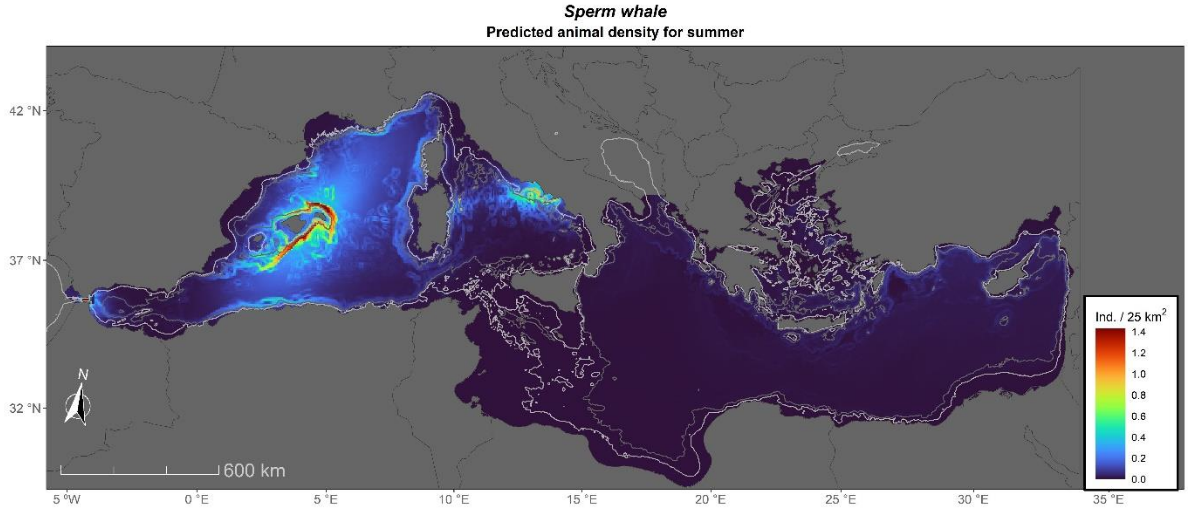

Figure F-23. Map of predicted densities in summer for sperm whale.

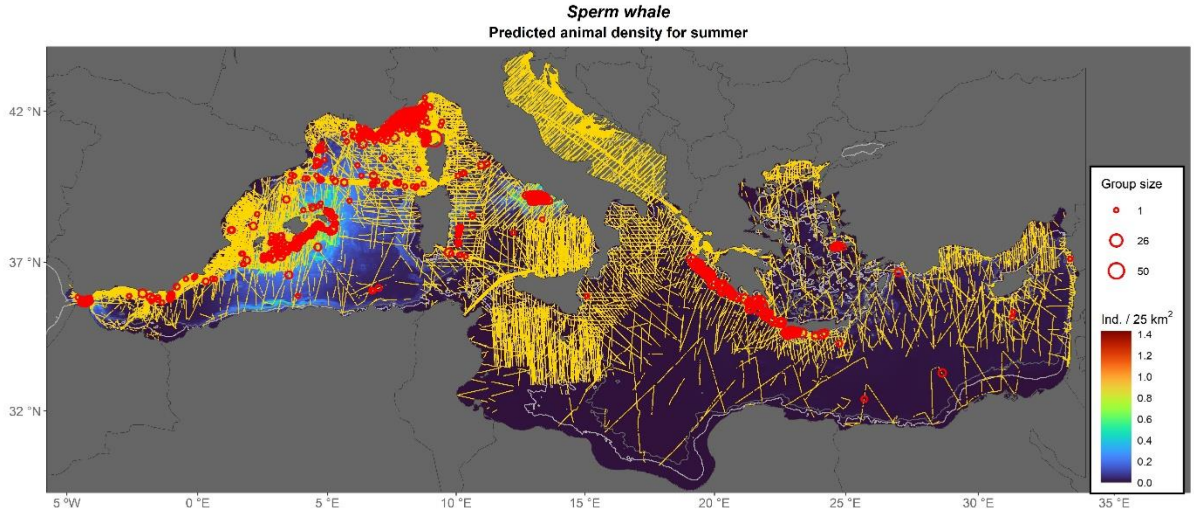

Figure F-24. Map of predicted densities in summer for sperm whale with tracks and observations.

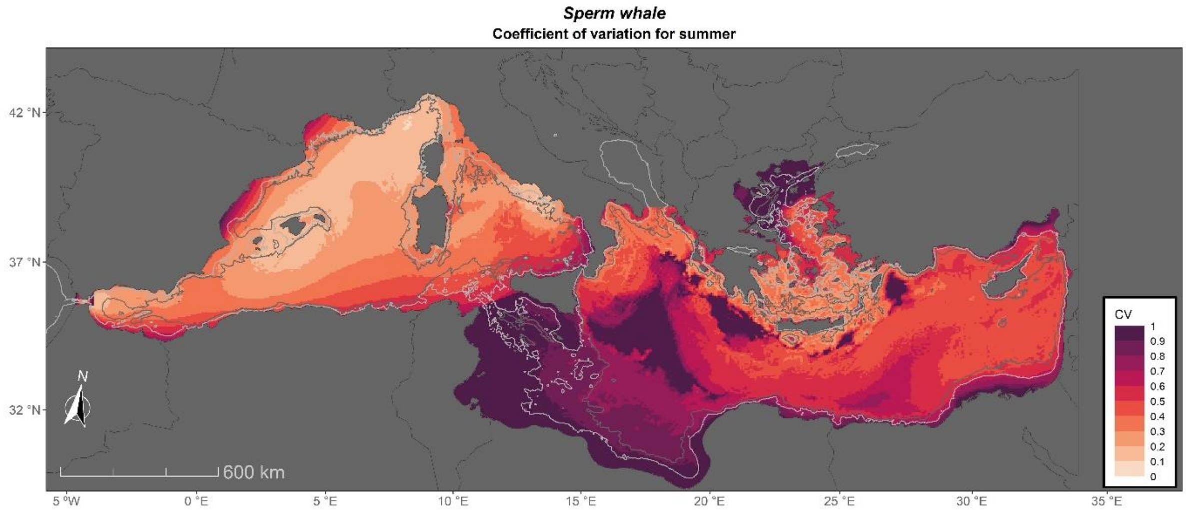

Figure F-25. Map of uncertainty (Coefficient of variation) in summer for sperm whale.

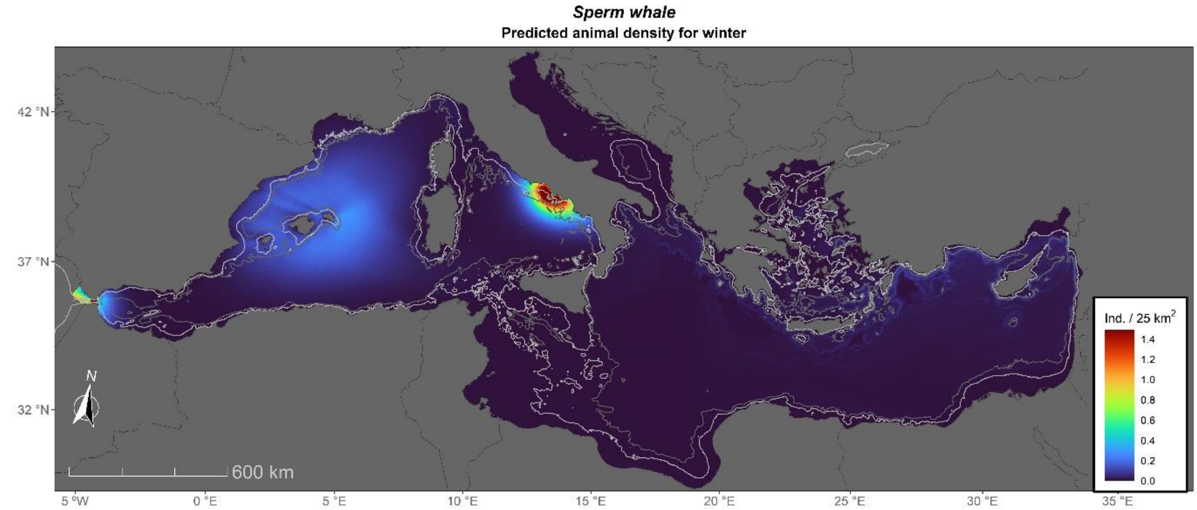

Figure F-26. Map of predicted densities in winter for sperm whale.

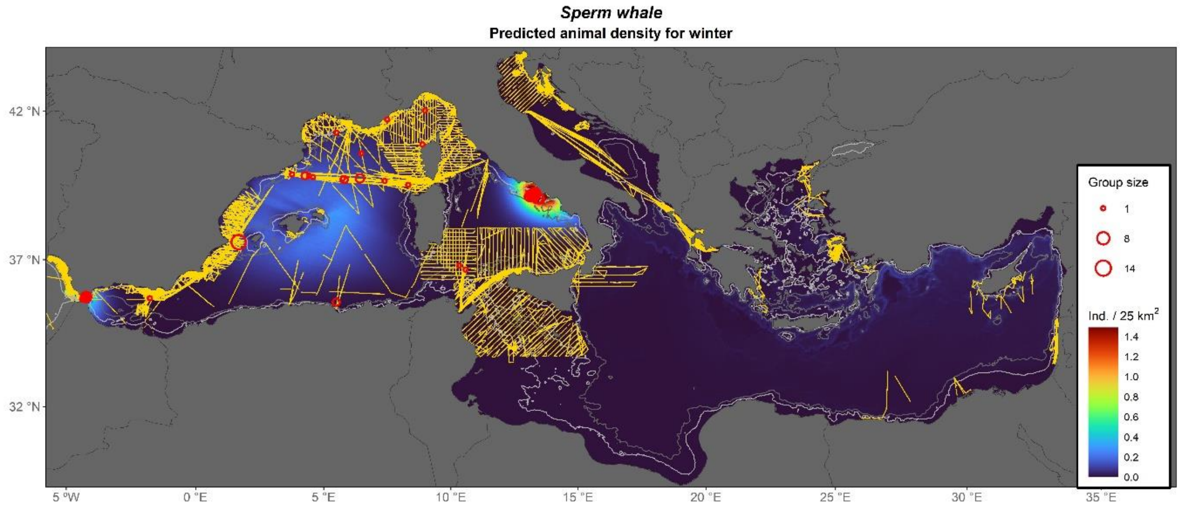

Figure F-27. Map of predicted densities in winter for sperm whale with tracks and observations.

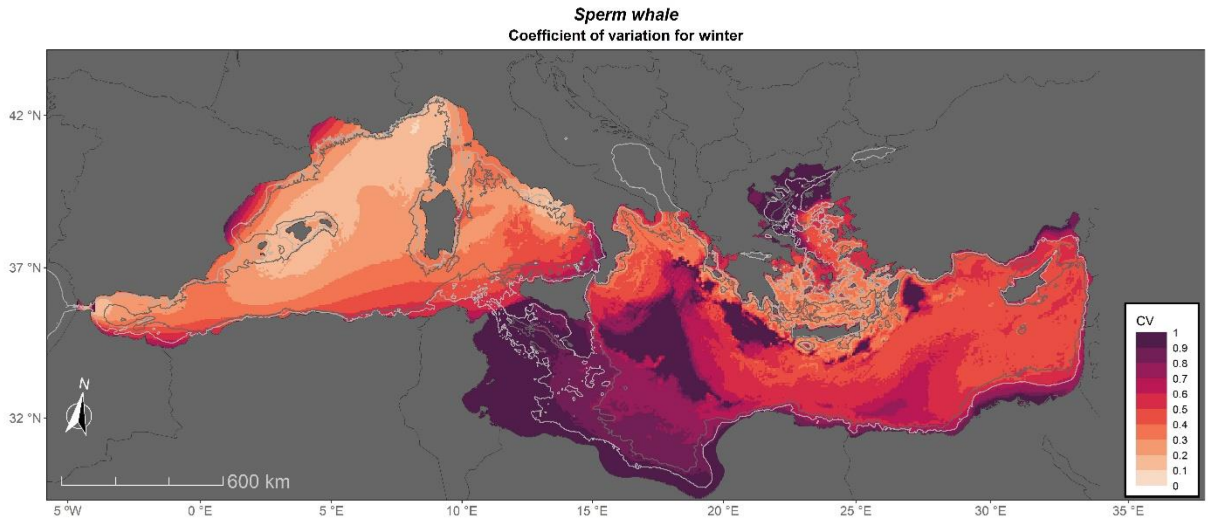

Figure F-28. Map of uncertainty (Coefficient of variation) in winter for sperm whale.

3.3. Risso's dolphin

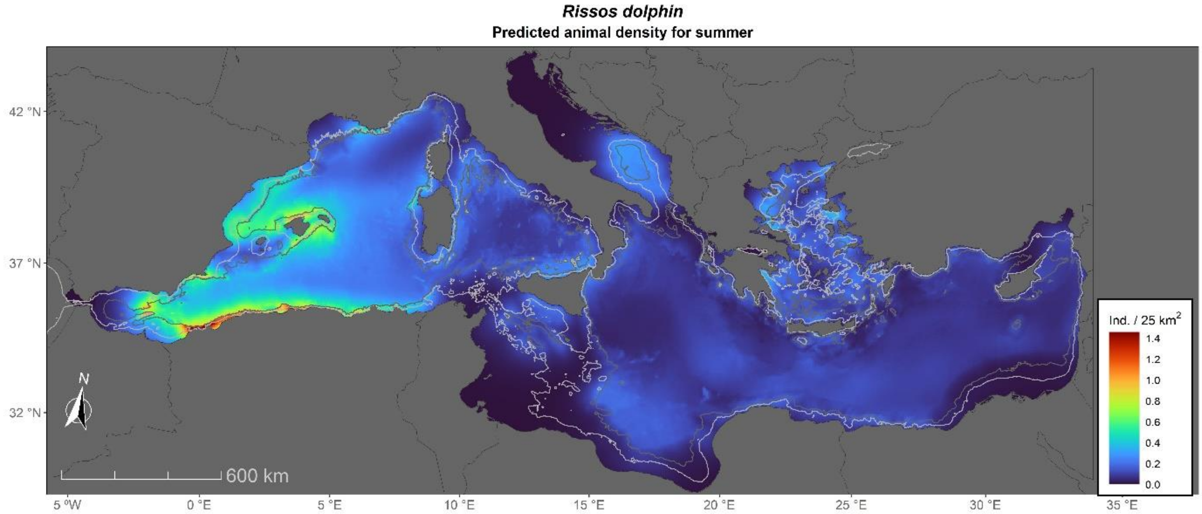

Figure F-29. Map of predicted densities in summer for Risso's dolphin.

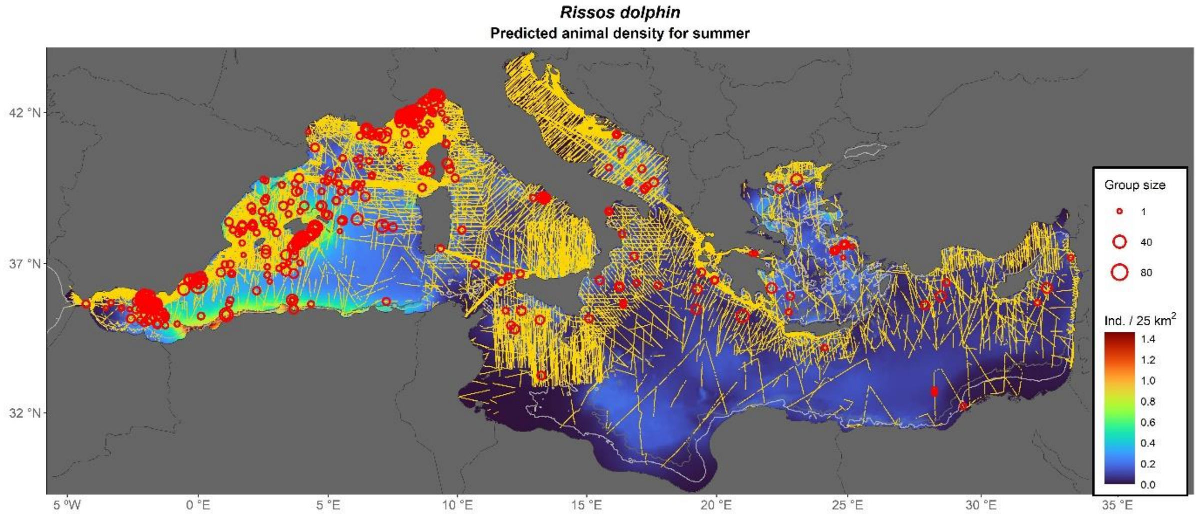

Figure F-30. Map of predicted densities in summer for Risso's dolphin with tracks and observations.

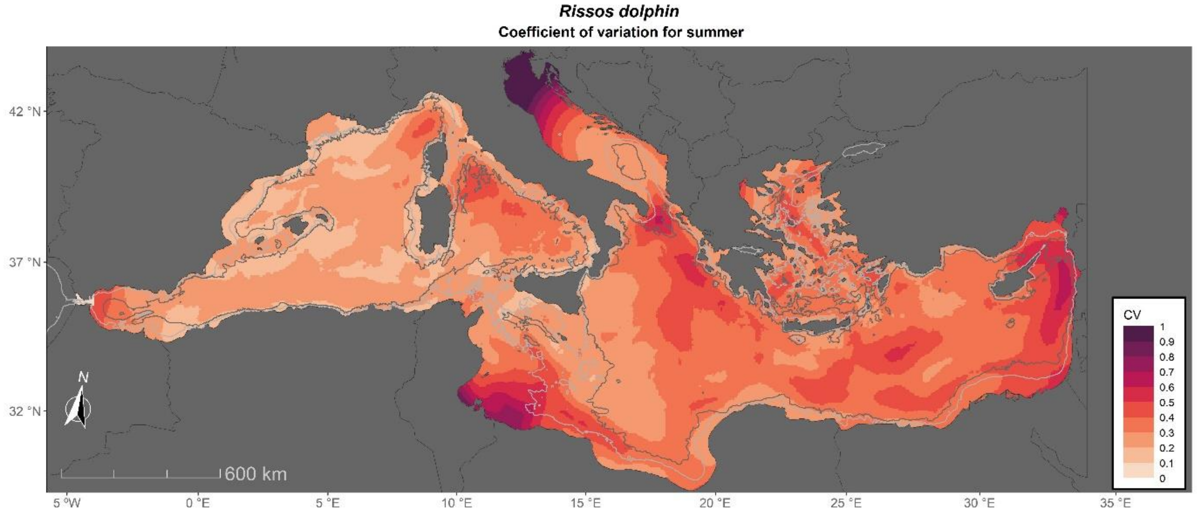

Figure F-31. Map of uncertainty (Coefficient of variation) in summer for Risso's dolphin.

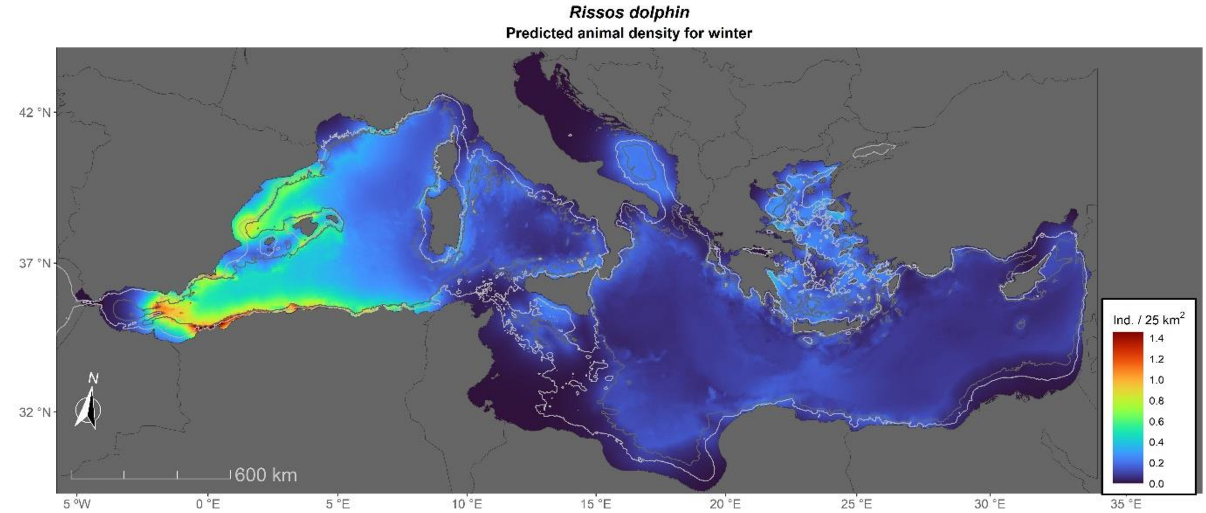

Figure F-32. Map of predicted densities in winter for Risso's dolphin.

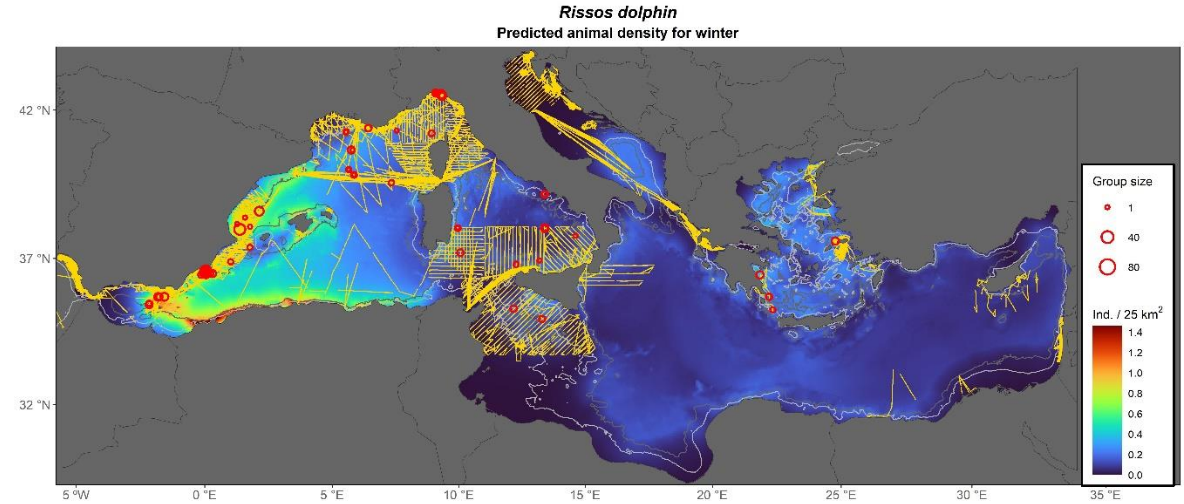

Figure F-33. Map of predicted densities in winter for Risso's dolphin with tracks and observations.

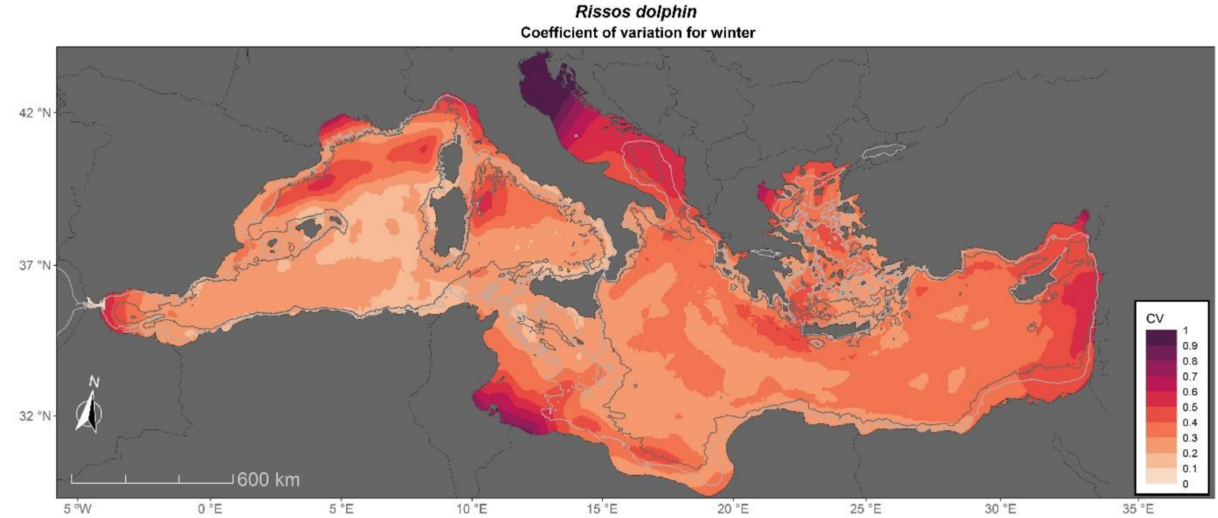

Figure F-34. Map of uncertainty (Coefficient of variation) in winter for Risso's dolphin.

3.4. Long-finned pilot whale

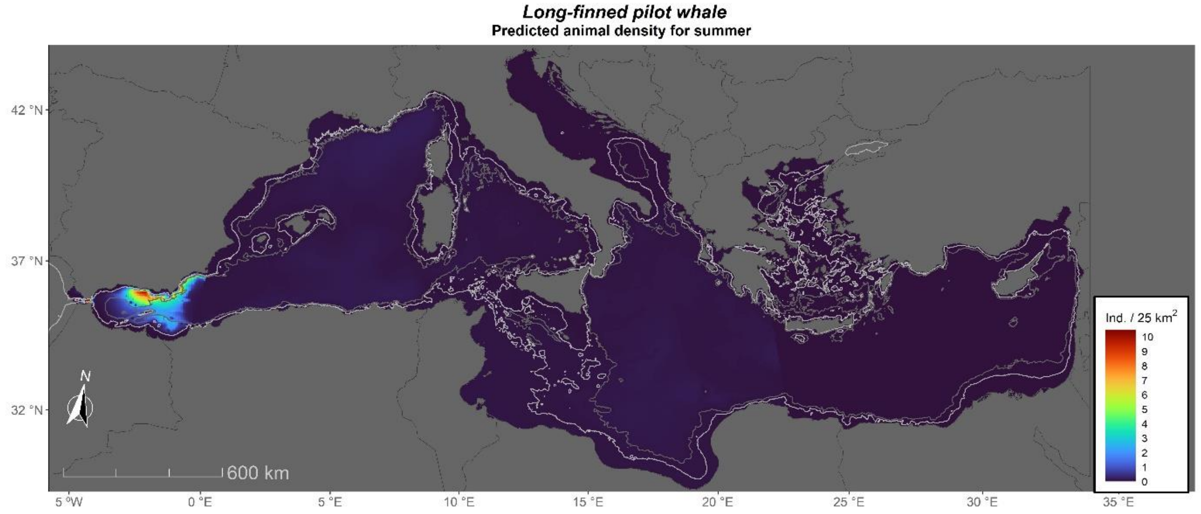

Figure F-35. Map of predicted densities in summer for long-finned pilot whale.

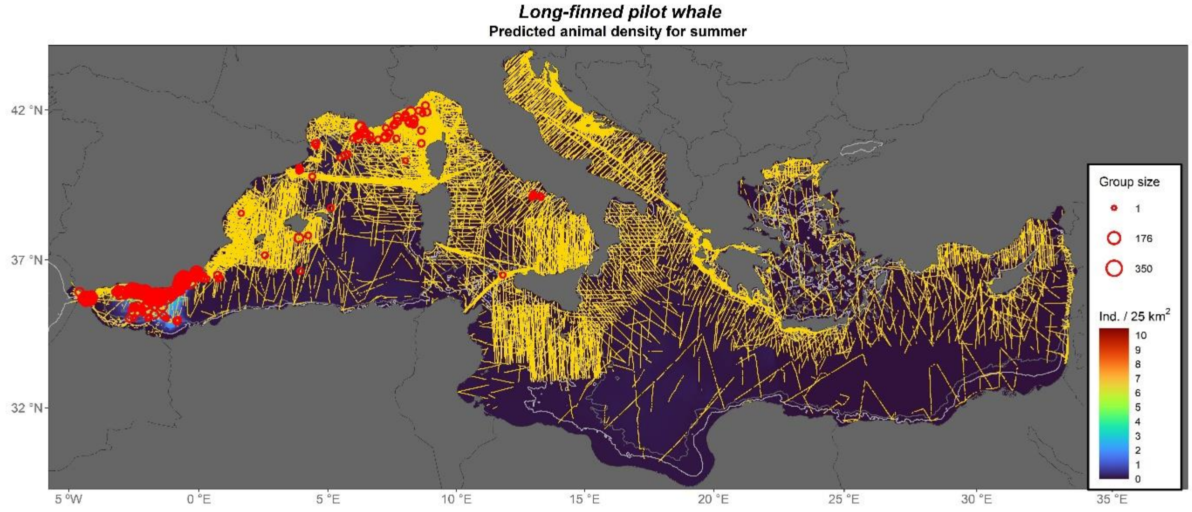

Figure F-36. Map of predicted densities in summer for long-finned pilot whale with tracks and observations.

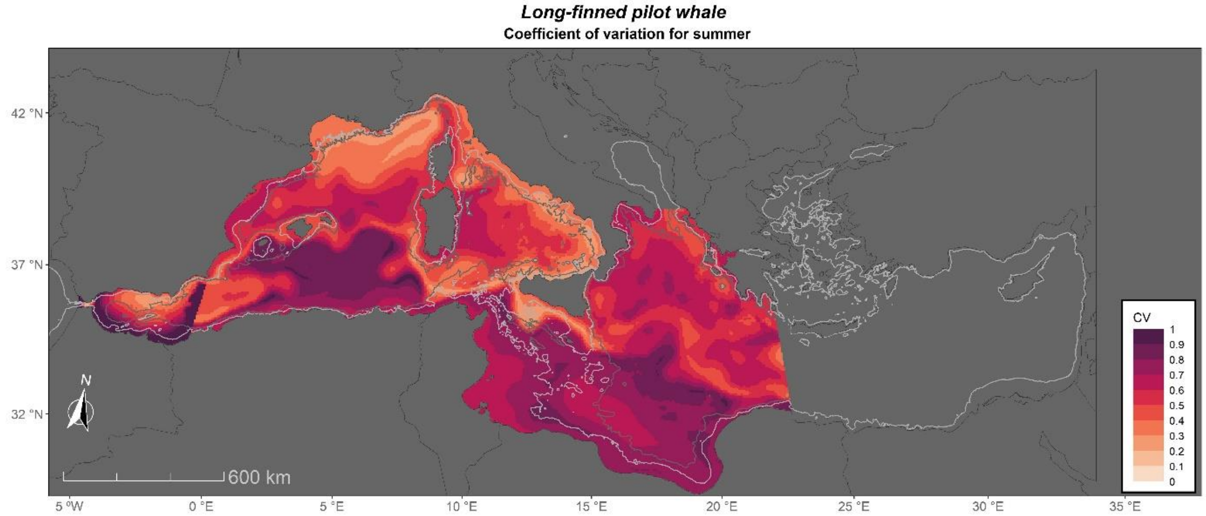

Figure F-37. Map of uncertainty (Coefficient of variation) in summer for long-finned pilot whale.

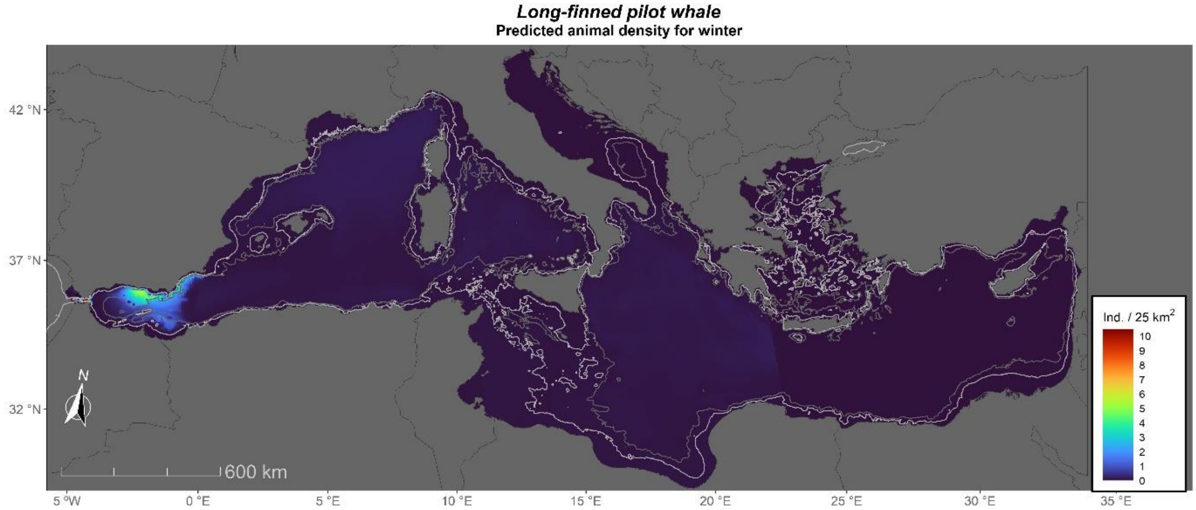

Figure F-38. Map of predicted densities in winter for long-finned pilot whale.

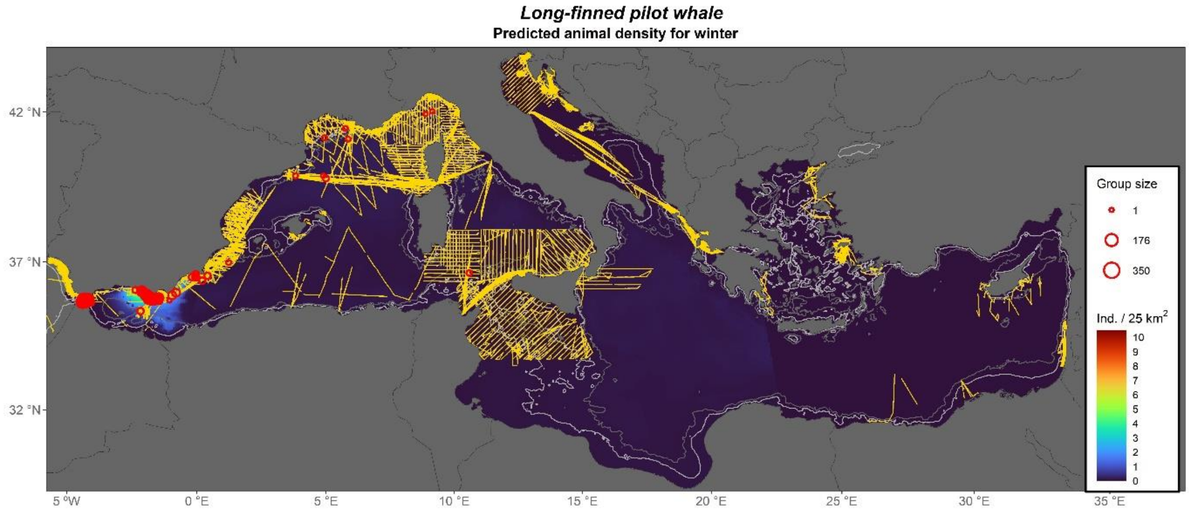

Figure F-39. Map of predicted densities in winter for long-finned pilot whale with tracks and observations.

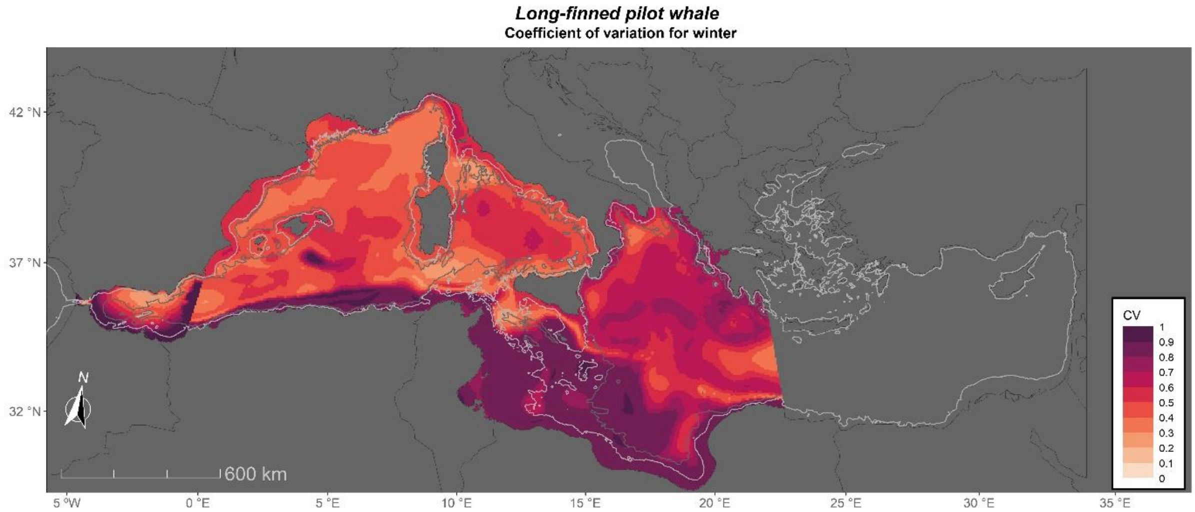

Figure F-40. Map of uncertainty (Coefficient of variation) in winter for long-finned pilot whale.

3.5. Cuvier's beaked whales

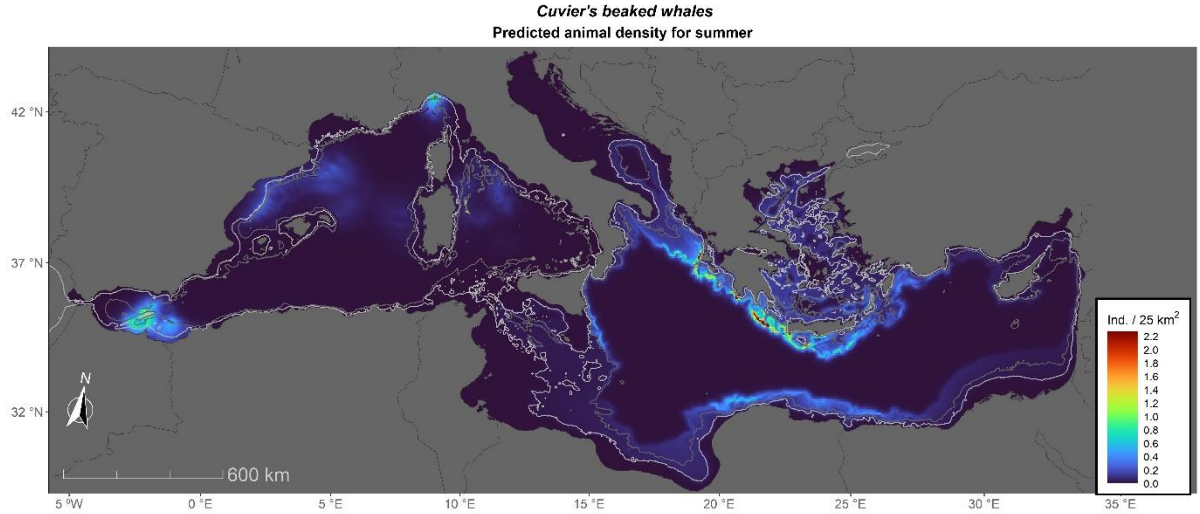

Figure F-41. Map of predicted densities in summer for Cuvier's beaked whales.

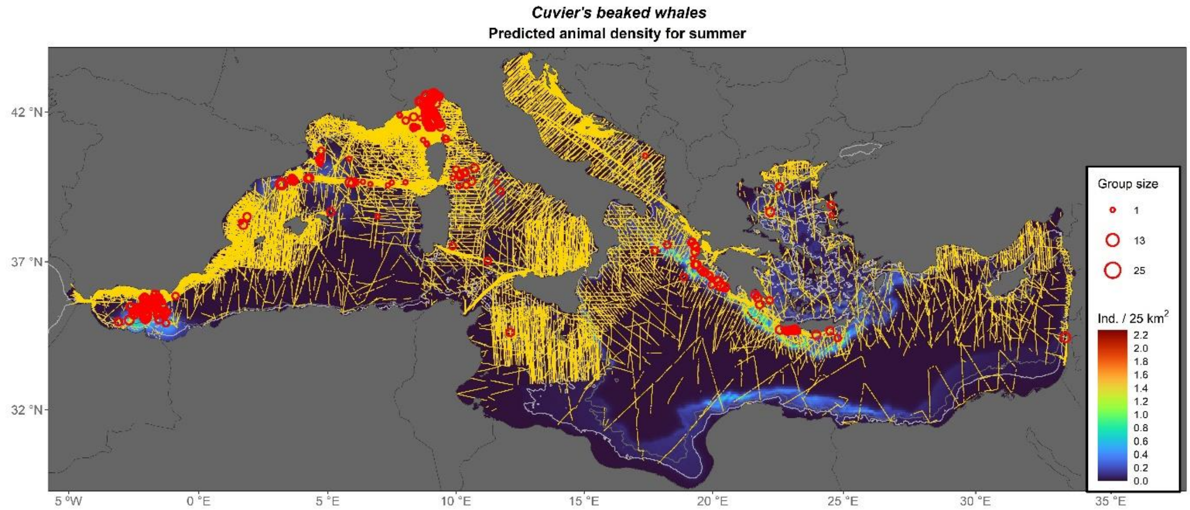

Figure F-42. Map of predicted densities in summer for Cuvier's beaked whales with tracks and observations.

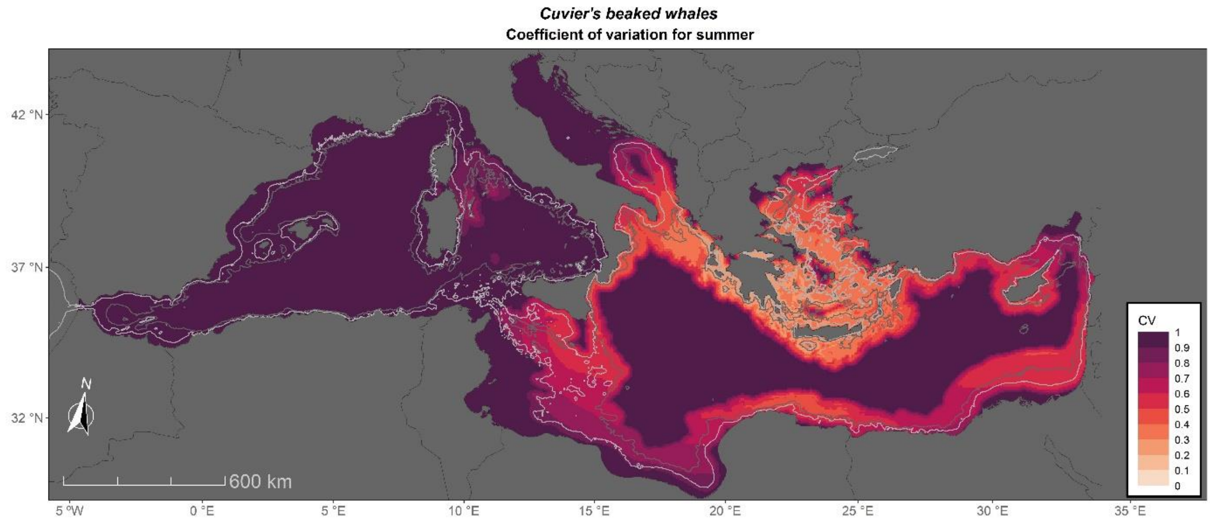

Figure F-43. Map of uncertainty (Coefficient of variation) in summer for Cuvier's beaked whales.

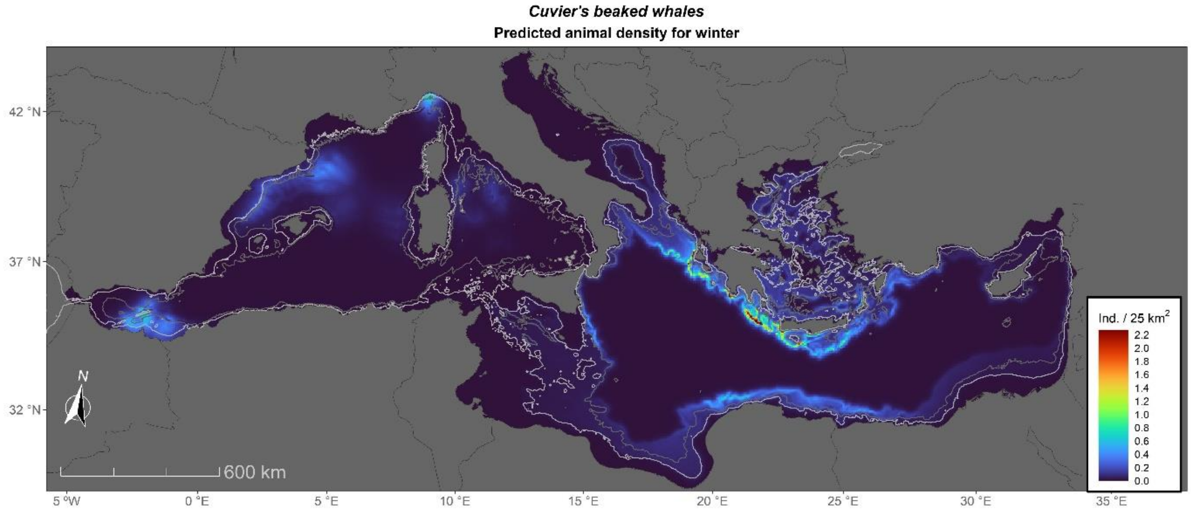

Figure F-44. Map of predicted densities in winter for Cuvier's beaked whales.

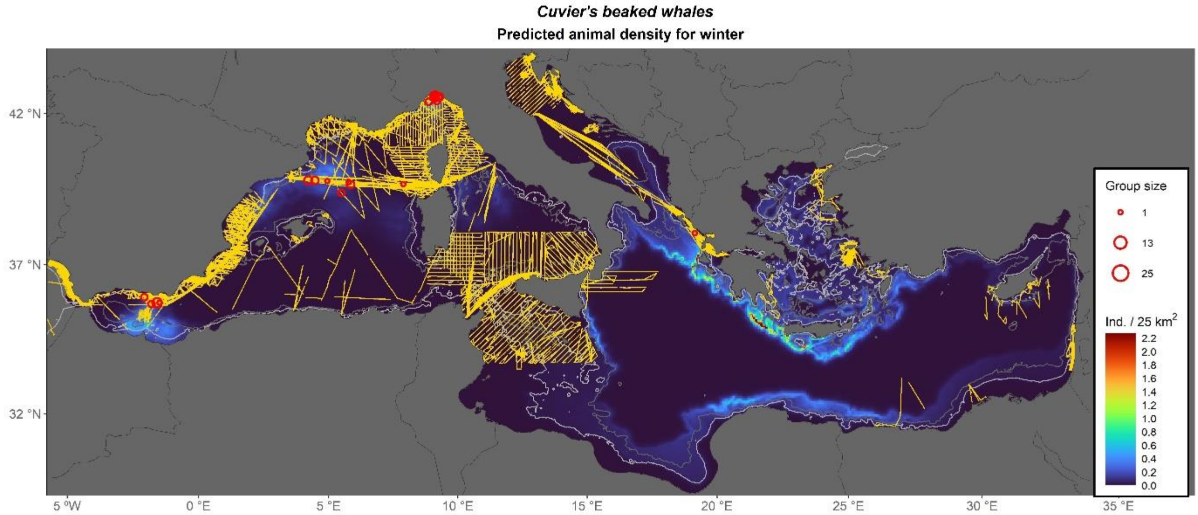

Figure F-45. Map of predicted densities in winter for Cuvier's beaked whales with tracks and observations.

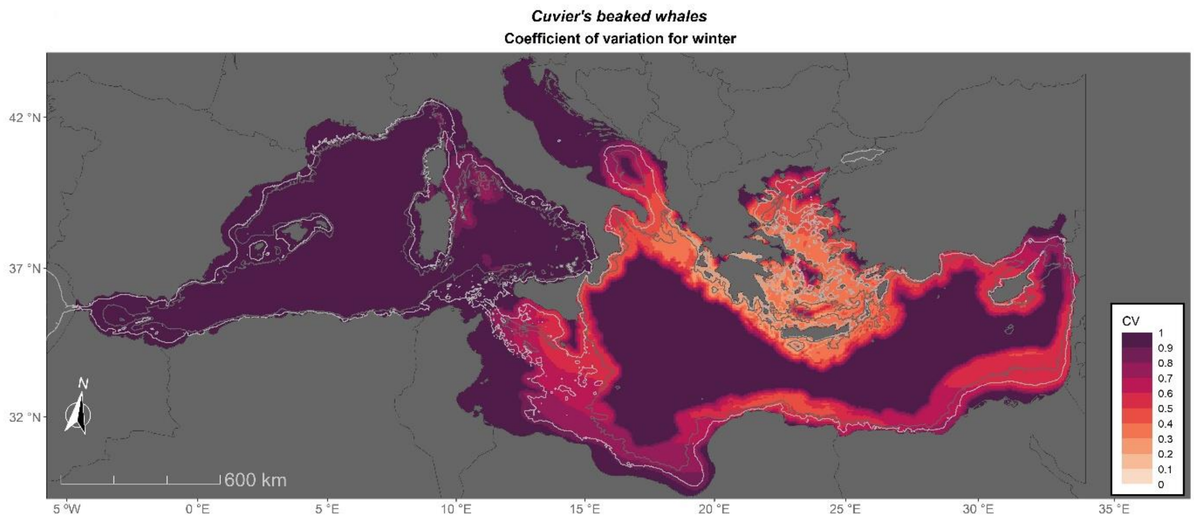

Figure F-46. Map of uncertainty (Coefficient of variation) in winter for Cuvier's beaked whales.

3.6. Bottlenose dolphin

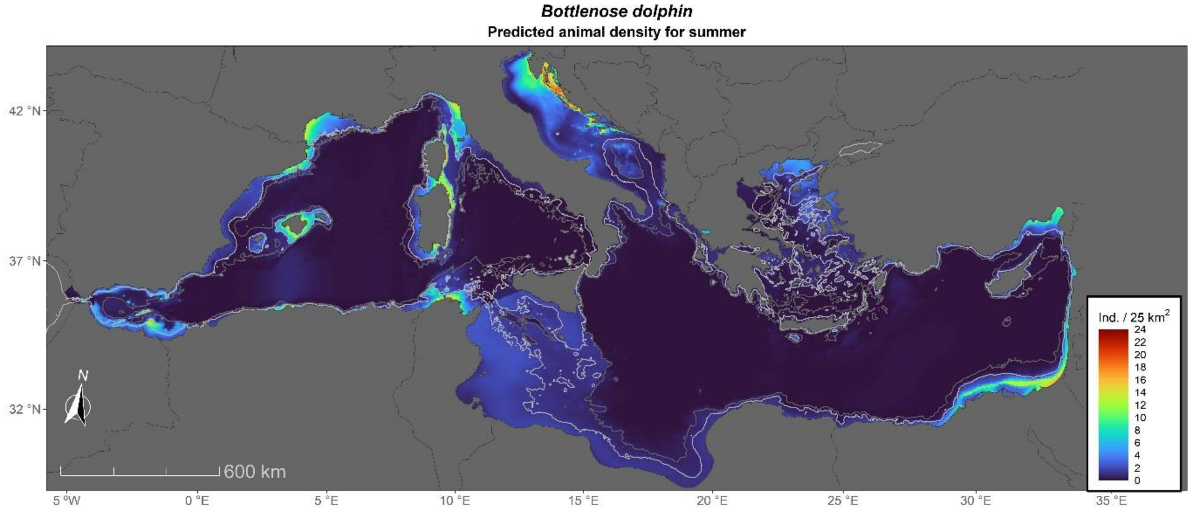

Figure F-47. Map of predicted densities in summer for bottlenose dolphin.

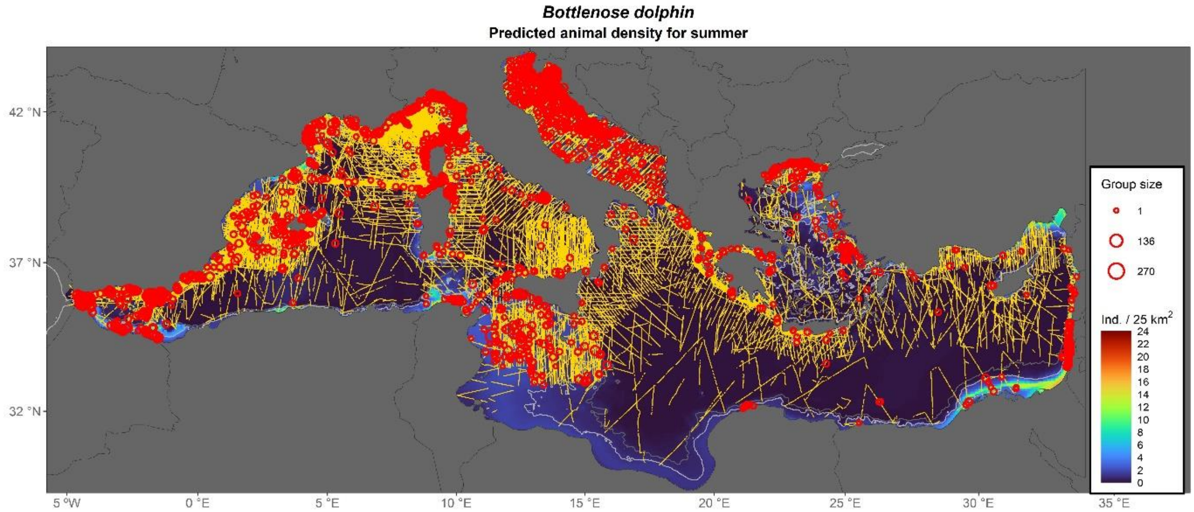

Figure F-48. Map of predicted densities in summer for bottlenose dolphin with tracks and observations.

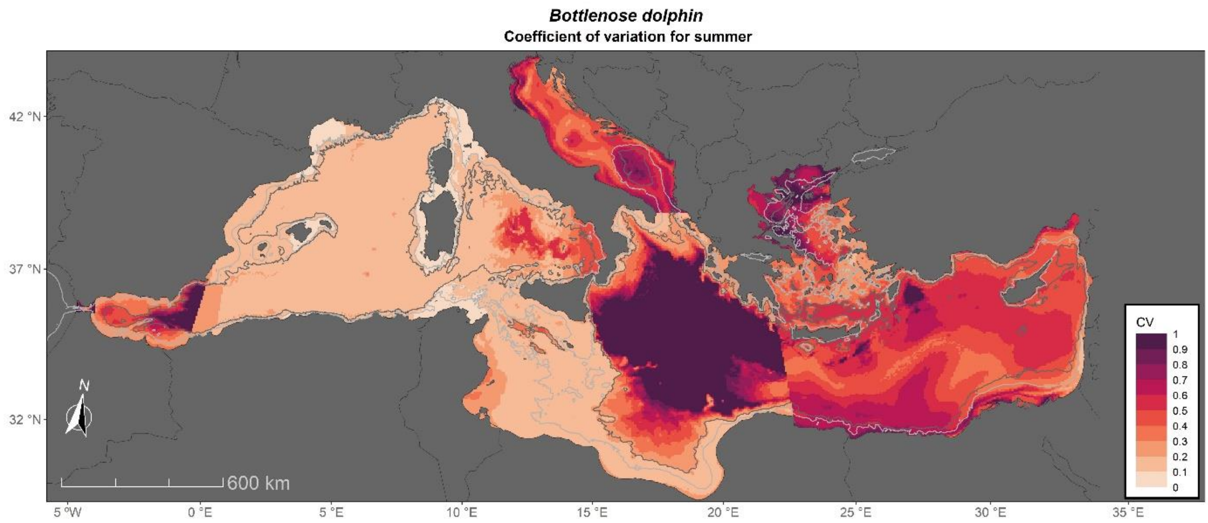

Figure F-49. Map of uncertainty (Coefficient of variation) in summer for bottlenose dolphin.

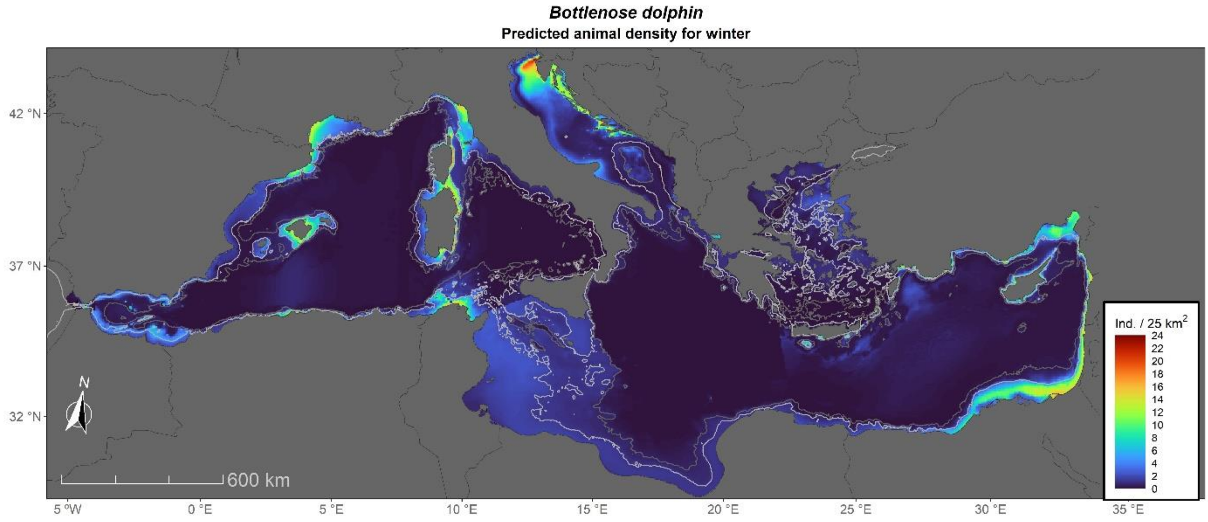

Figure F-50. Map of predicted densities in winter for bottlenose dolphin.

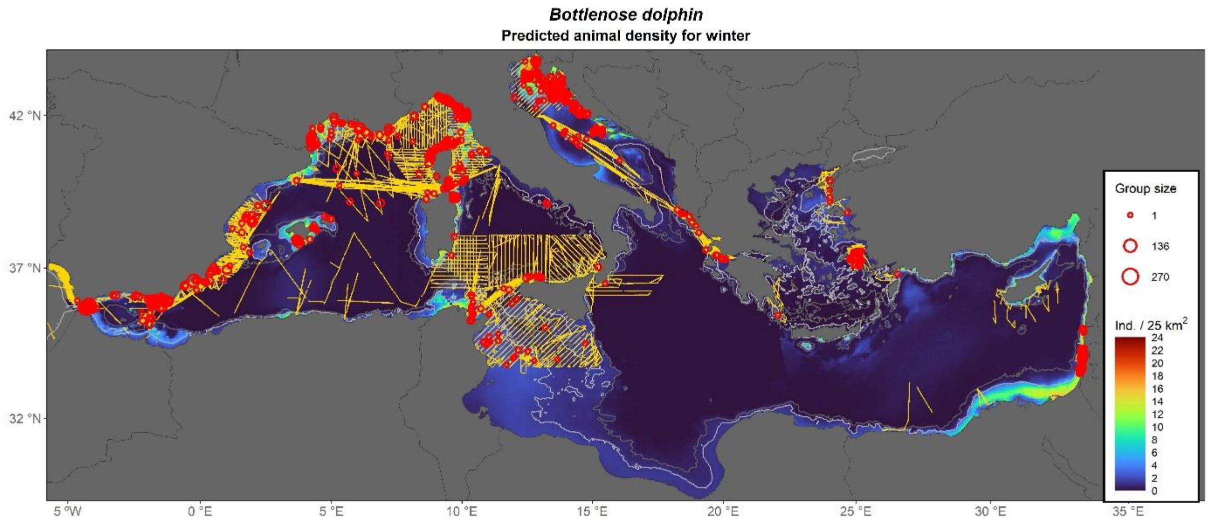

Figure F-51. Map of predicted densities in winter for bottlenose dolphin with tracks and observations.

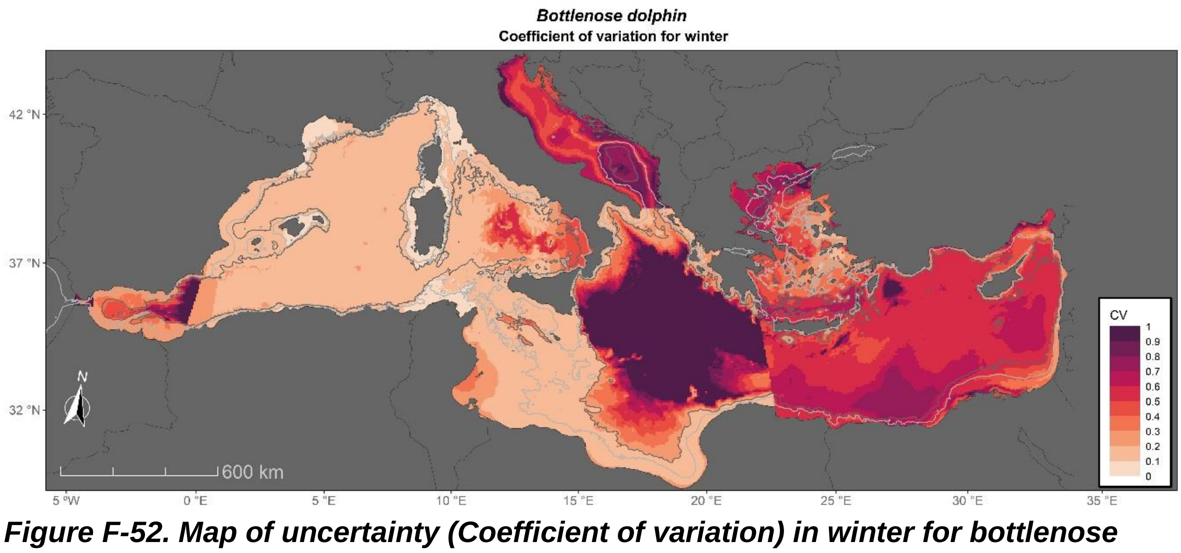

Figure F-52. Map of uncertainty (Coefficient of variation) in winter for bottlenose dolphin.

3.7. Common dolphin

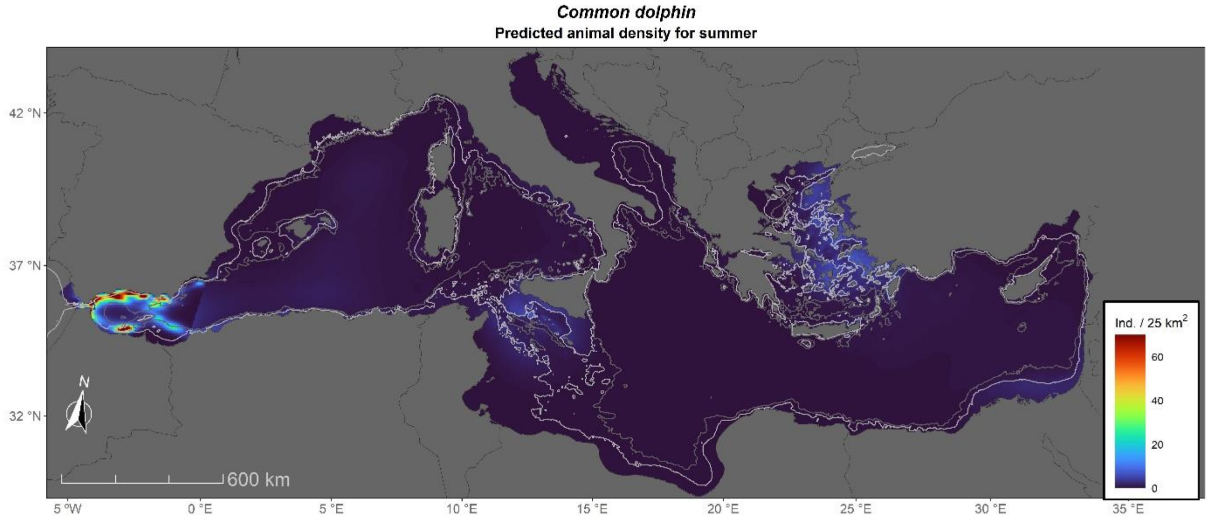

Figure F-53. Map of predicted densities in summer for common dolphin.

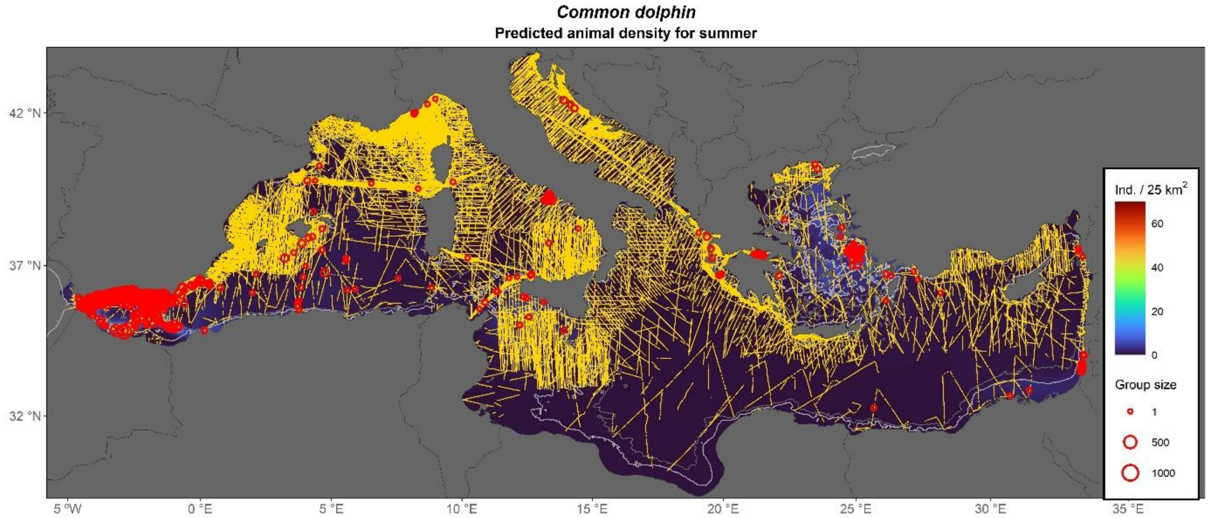

Figure F-54. Map of predicted densities in summer for common dolphin with tracks and observations.

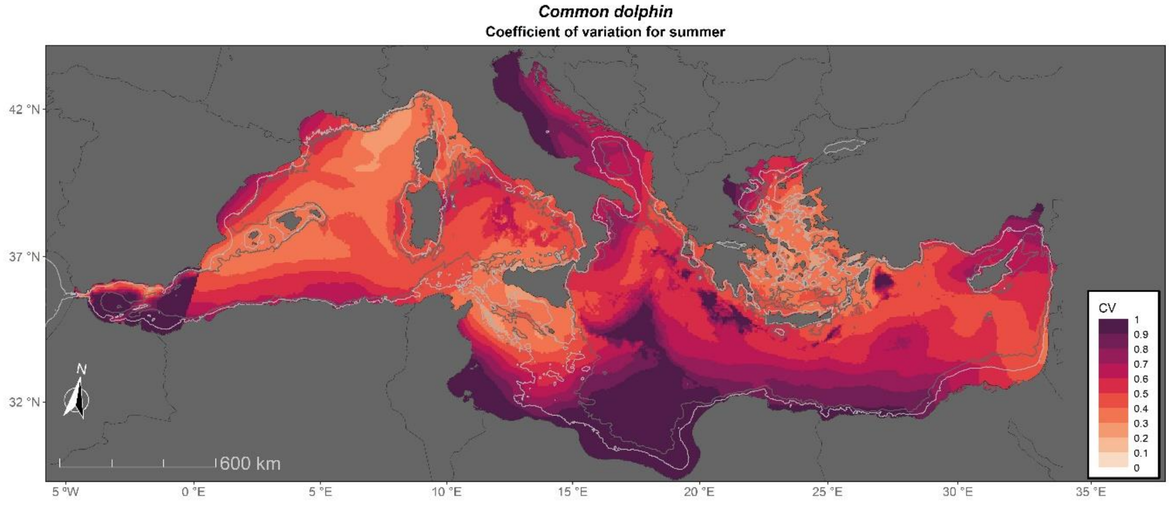

Figure F-55. Map of uncertainty (Coefficient of variation) in summer for common dolphin.

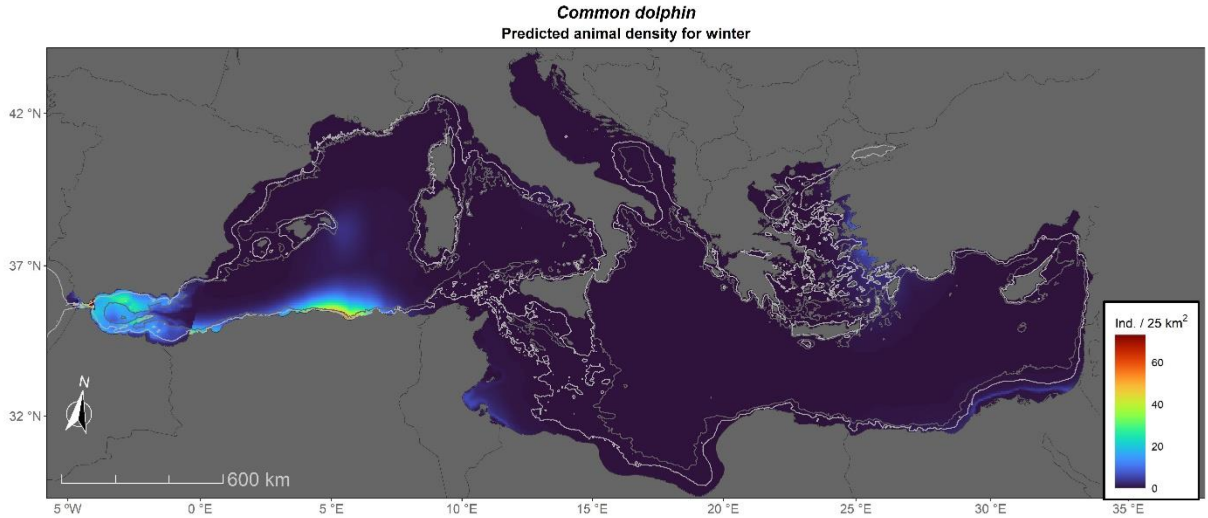

Figure F-56. Map of predicted densities in winter for common dolphin.

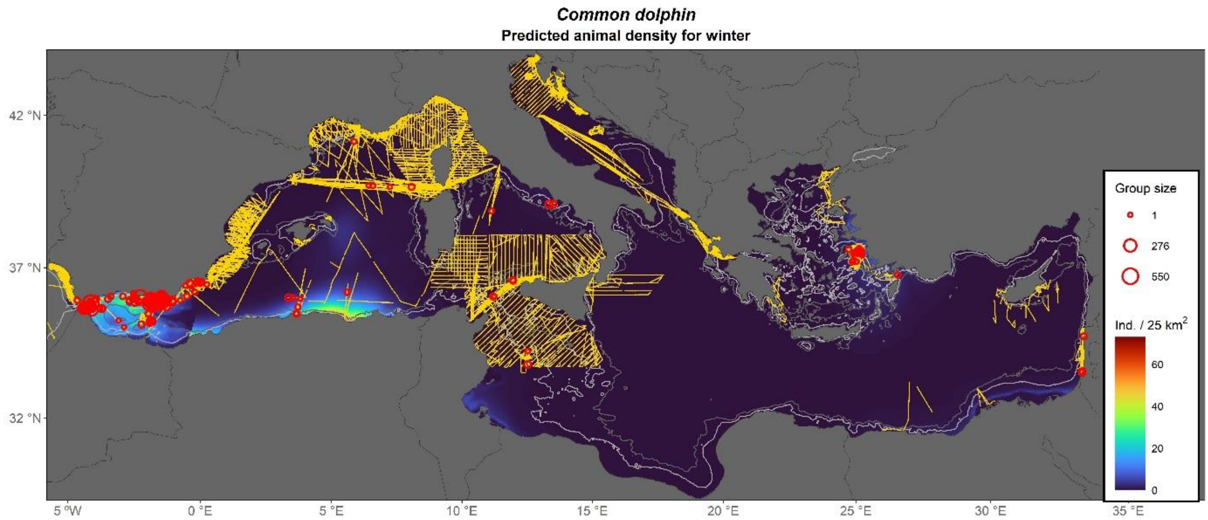

Figure F-57. Map of predicted densities in winter for common dolphin with tracks and observations.

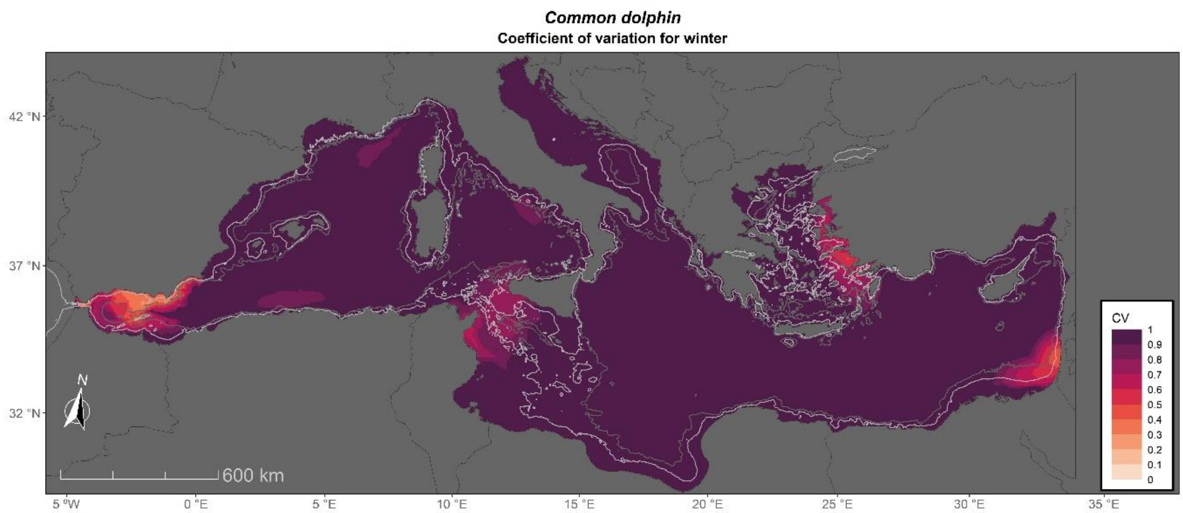

Figure F-58. Map of uncertainty (Coefficient of variation) in winter for common dolphin.

3.8. Striped dolphin

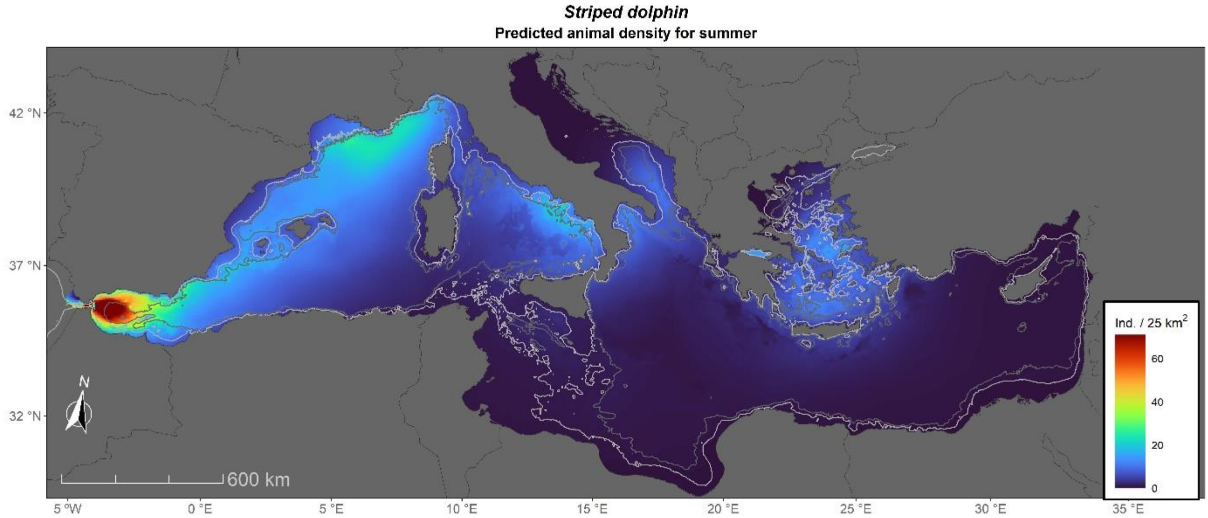

Figure F-59. Map of predicted densities in summer for striped dolphin.

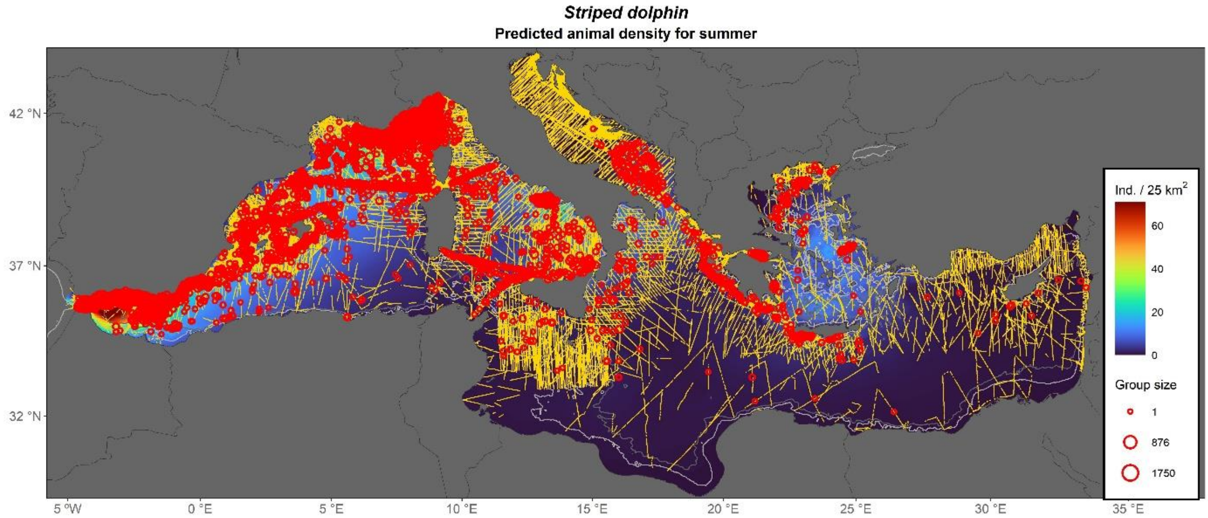

Figure F-60. Map of predicted densities in summer for striped dolphin with tracks and observations.

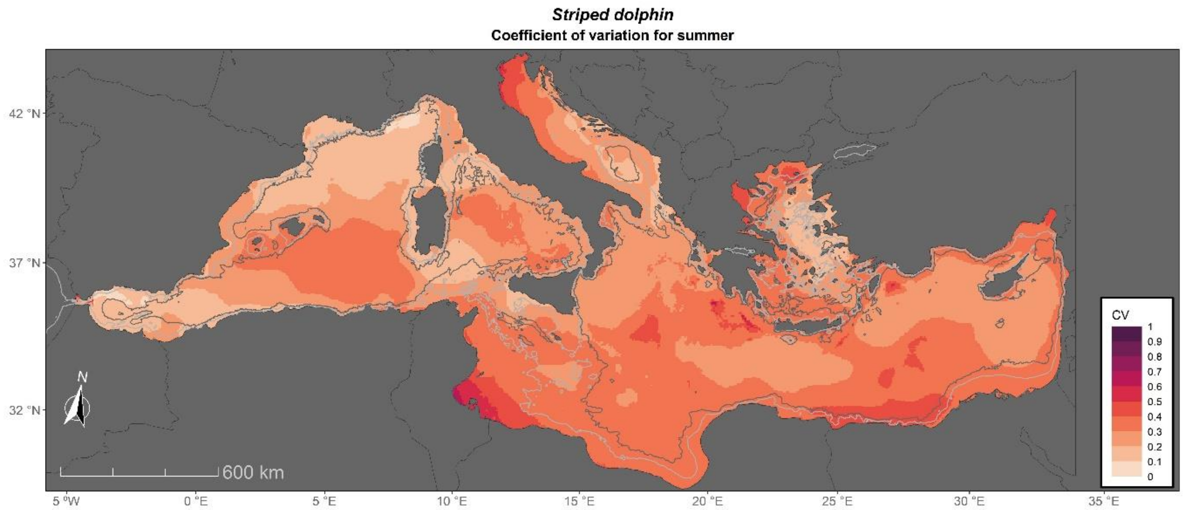

Figure F-61. Map of uncertainty (Coefficient of variation) in summer for striped dolphin.

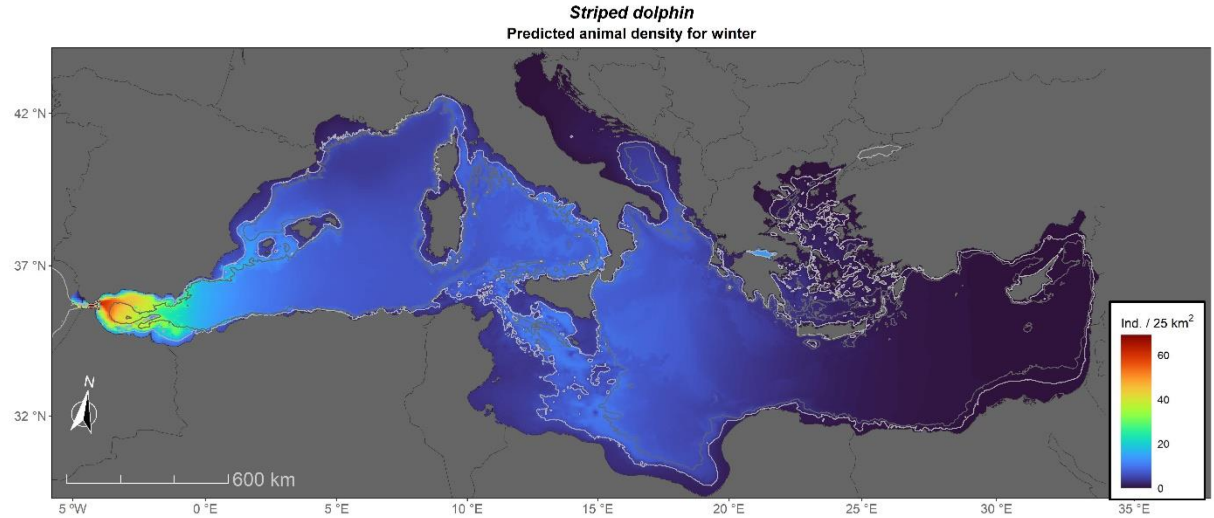

Figure F-62. Map of predicted densities in winter for striped dolphin.

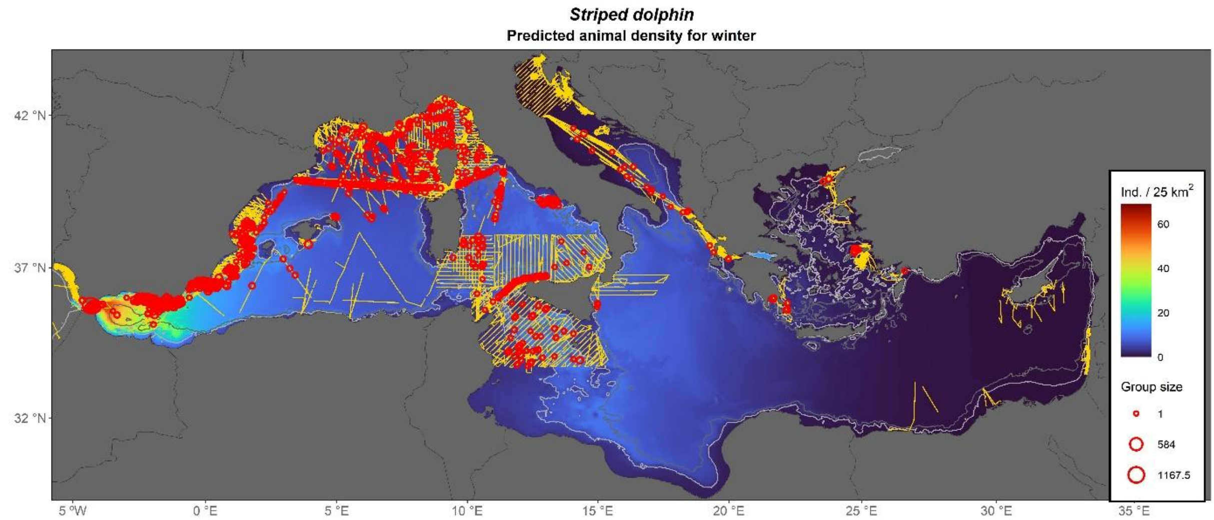

Figure F-63. Map of predicted densities in winter for striped dolphin with tracks and observations.

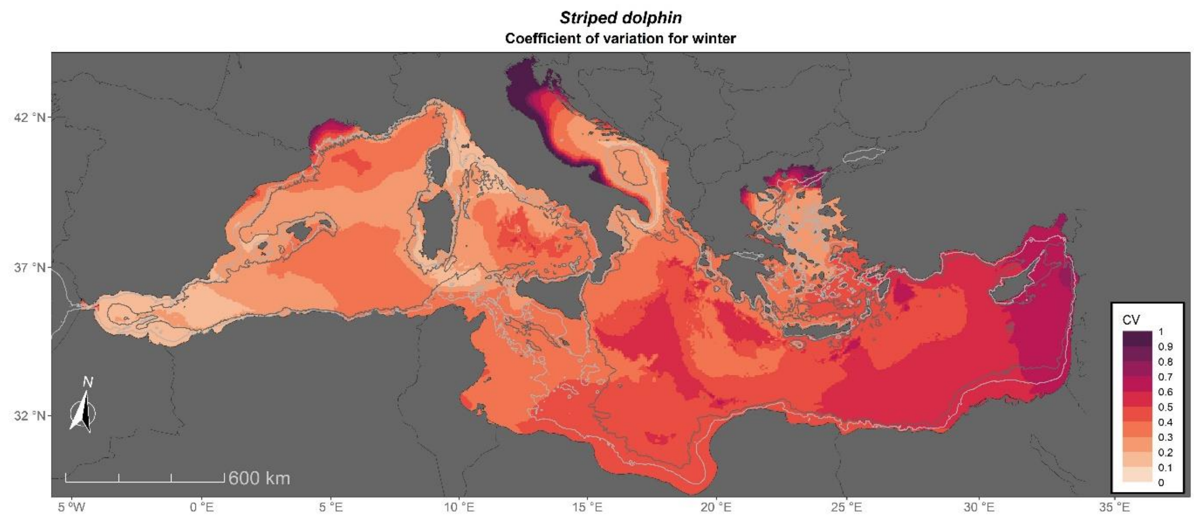

Figure F-64. Map of uncertainty (Coefficient of variation) in winter for striped dolphin.

3.9. Harbor porpoise

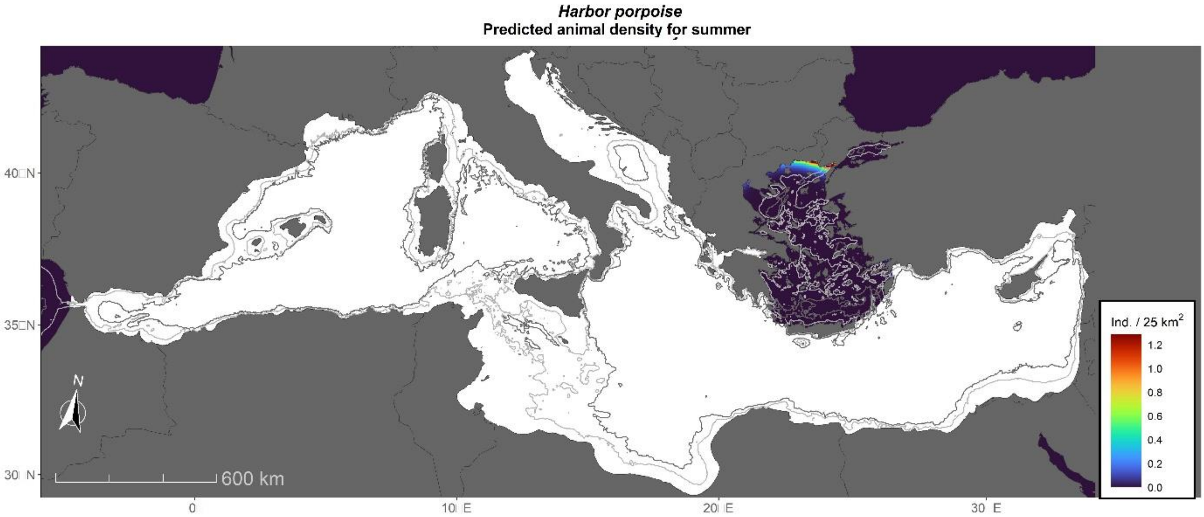

Figure F-65. Map of predicted densities in summer for harbor porpoise.

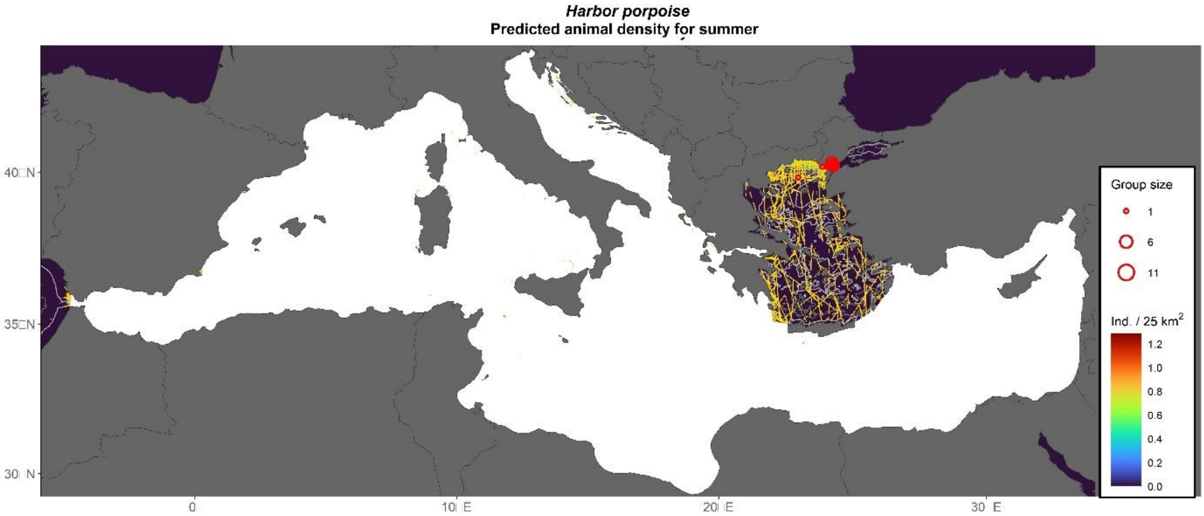

Figure F-66. Map of predicted densities in summer for harbor porpoise with tracks and observations.

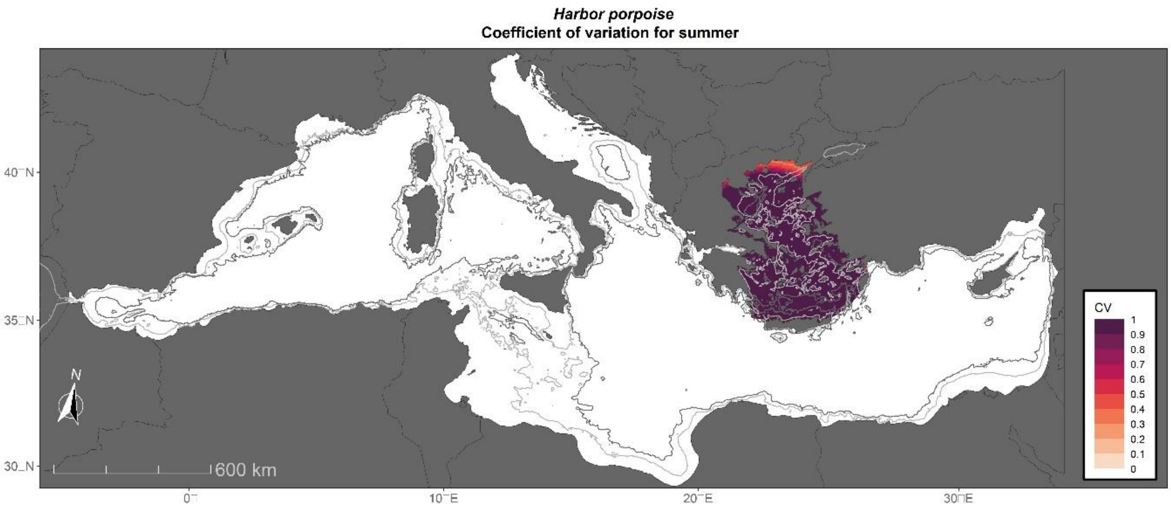

Figure F-67. Map of uncertainty (Coefficient of variation) in summer for Harbor porpoise.

3.10. Killer whale

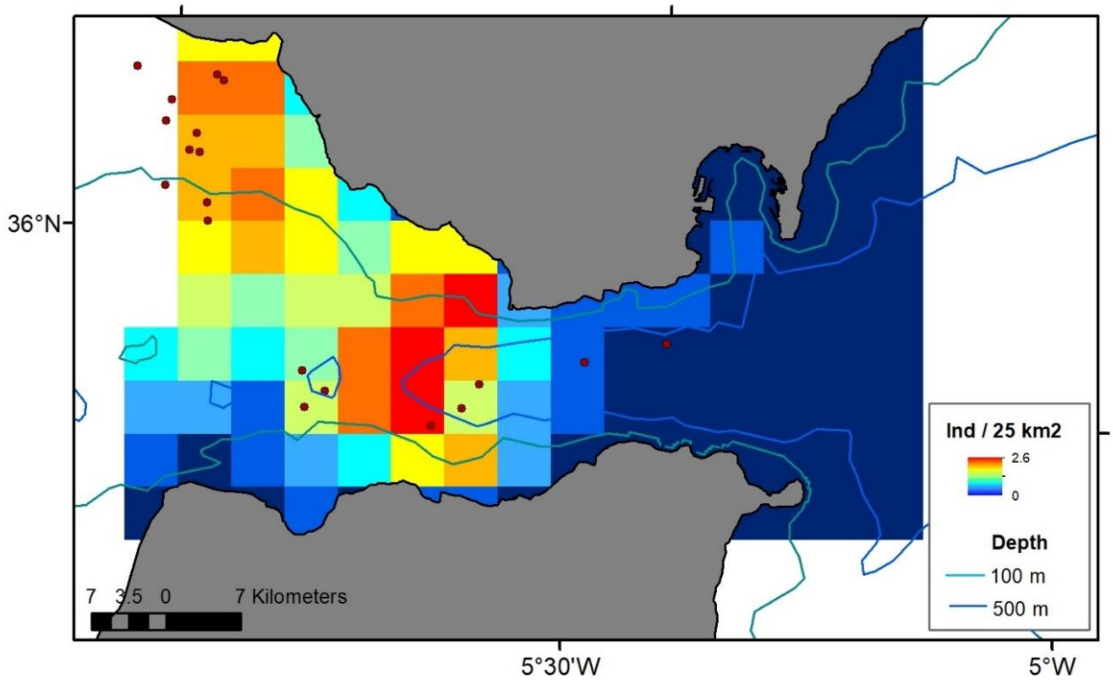

Figure F-68. Map of predicted densities in spring for killer whale with observations.

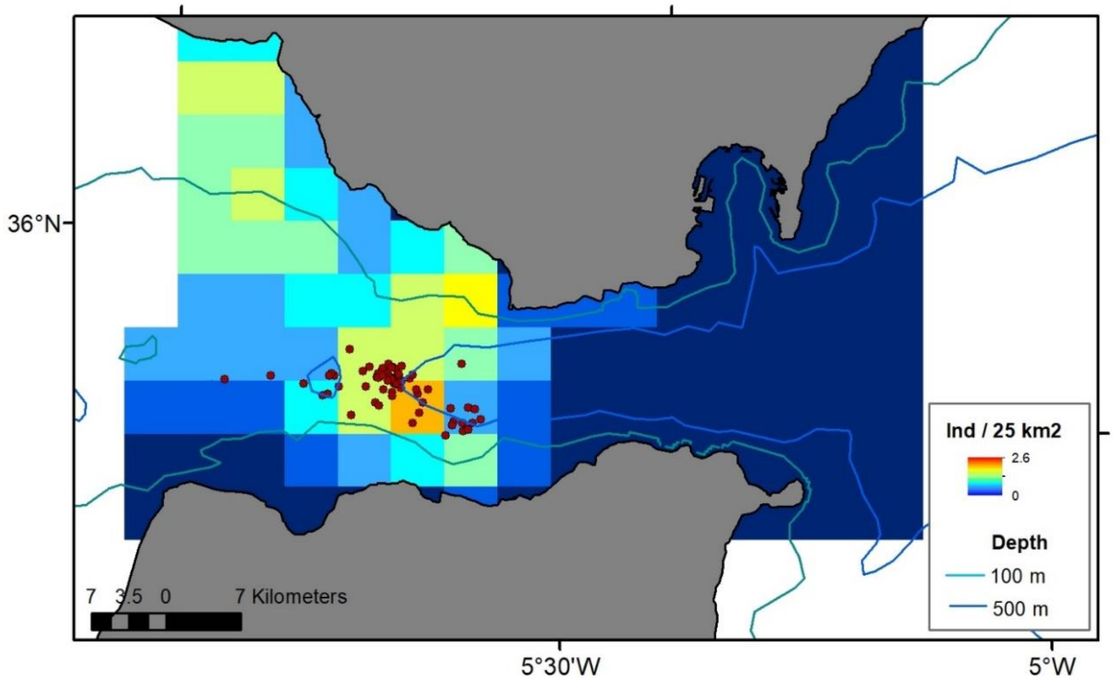

Figure F-69. Map of predicted densities in summer for killer whale with observations.

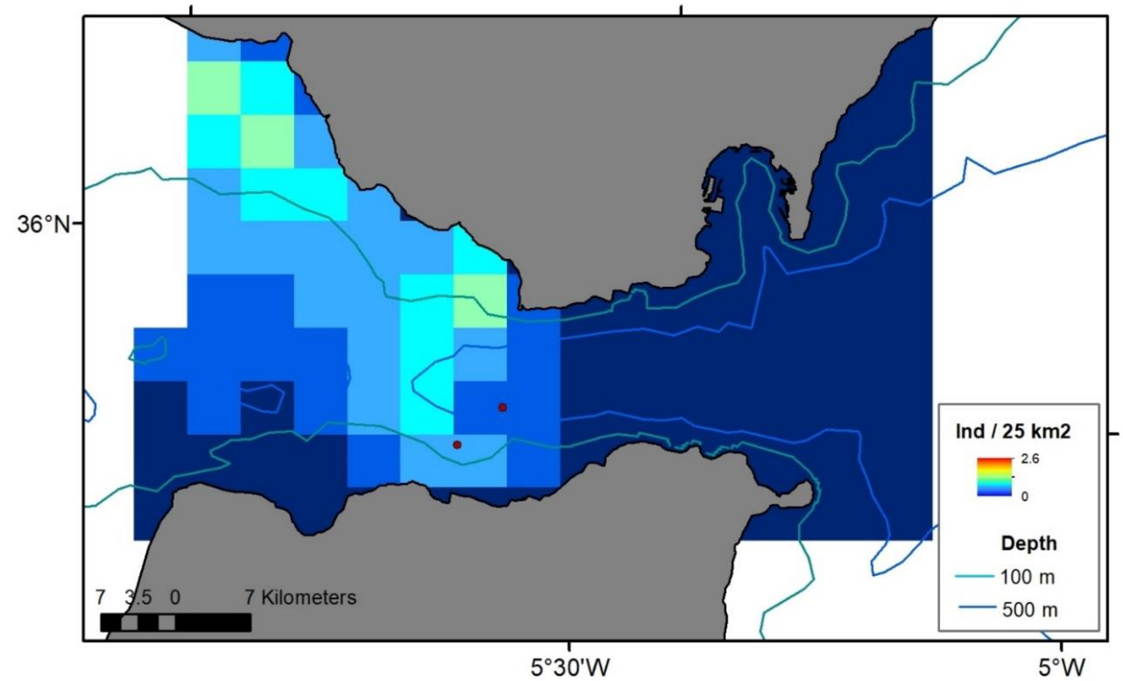

Figure F-70. Map of predicted densities in winter for killer whale with observations.

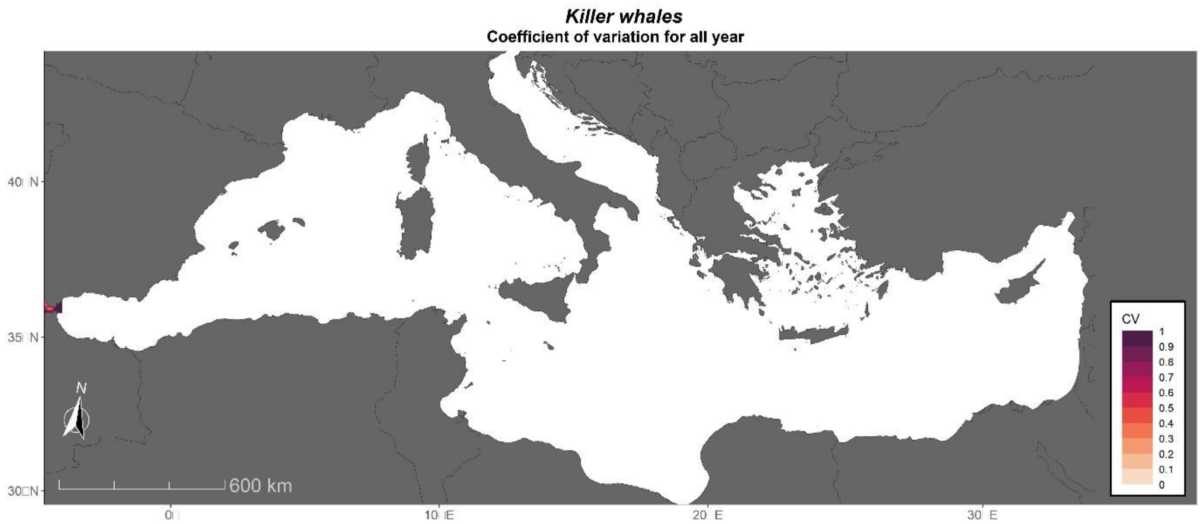

Figure F-71. Map of uncertainty (Coefficient of variation) for all seasons for killer whale.

G

State of science on monk seals

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Appendix G: State of science on monk seals

Review of the state of the science on Mediterranean monk seal (*Monachus monachus*): abundance, distribution, and research in support of the development of density estimates for the Mediterranean and Black Seas

Supplementary Report

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Acknowledgments

We would like to thank all of the marine mammal experts (named and unnamed in this report) and the Duke University Marine Geospatial Ecology Lab members that have shared their time, advice, data, and feedback on this project. Additionally, we thank all of the scientists that have collected and analyzed data that made it possible to provide estimated marine mammal densities. Funding for this project was provided by United States Fleet Forces Command and was managed on their behalf by Naval Facilities Engineering Systems Command, Atlantic.

Table of Contents

1. Introduction

The Mediterranean monk seal (*Monachus monachus*) is a highly endangered marine mammal that is protected under United States (US) federal environmental and natural resources laws and regulations such as the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). Therefore, the US Navy would benefit from incorporating a Mediterranean monk seal spatial density model, if available, to evaluate the potential effects to this species that would result from any activities in the Mediterranean and Black Seas. If sufficient data existed and a suitable modeling method could be applied, a density surface model for Mediterranean monk seals and its associated uncertainty estimate (quantitative or qualitative), similar to the Mediterranean spatial density models for other marine mammal species published by Mannocci et al. (2018), would be provided to the US Navy within the latest version of the Navy Marine Species Density Database (NMSDD). This layer would integrate survey data into a modeling framework to develop a density model that could be reviewed by data stakeholders, with details included in the final technical report associated with other marine mammal density models developed for the NMSDD.

Once abundant and present throughout the Mediterranean and Black Seas, as well as off the Atlantic coasts of northwestern Africa and Macaronesia, the Mediterranean monk seal has recently suffered dramatic declines, both in abundance and geographical range (Johnson 1999; Karamanlidis et al. 2016, 2023). The greatest threats contributing to decreased populations of Mediterranean monk seals have been from fisheries (indirect and direct kills), habitat destruction, and harvest and trade (Johnson 1999). It is now estimated that fewer than 700 individuals survive in three or four isolated subpopulations in the eastern and western Mediterranean, the archipelago of Madeira and the Cabo Blanco area in the northeastern Atlantic Ocean (Karamanlidis et al. 2016, 2023; Karamanlidis and Dendrinos 2023). The eastern Mediterranean population's extent includes the eastern Mediterranean basin, Adriatic Sea, Ionian Sea, Aegean Sea, and Sea of Marmara (Karamanlidis et al. 2016, 2019; European Red List et al. 2023).

In the line transect survey data available for the Mediterranean marine mammal density models published by Mannocci et al. (2018), there were insufficient sightings of Mediterranean monk seals to attempt a model for the Mediterranean Sea. Updated surveys have been conducted since then, such as the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) surveys (Mannocci et al. 2018; Cañadas et al. 2023), but an initial review of survey coverage concluded that new data may still not be sufficient to integrate into a standard framework for marine mammal density modeling. Therefore, we reviewed the available scientific literature and engaged with data collaborators for the latest information and potential data on the Mediterranean monk seal related to the abundance, distribution, and research in support of estimating density. The data collection methods and resulting information we have gathered has been summarized here in support of future efforts on developing density estimates for Mediterranean monk seal populations in the Mediterranean and Black Seas.

2. Methods

We evaluated current and past research for Mediterranean monk seals in the Mediterranean and Black Seas, noted the subpopulation in the subregions, compiled potential sources of information, determined the data source that was the best available to estimate density and uncertainty (if any), and summarized the results with a brief discussion. We first searched for data collected using line transect survey methods, defined by Buckland et al. (2001), that could be used to estimate abundance and/or density of Mediterranean monk seals. This included the line-transect surveys within the Mediterranean, collected by aircraft and ship between 1997 and 2016, that were aggregated and assessed by Mannocci et al. (2018).

Starting in 2021, we continued to engage with international stakeholders in the Mediterranean region to gather any new information in support of updated marine mammal density models in the Mediterranean and Black Seas for the US NMSDD. We sent requests via email to over 70 individuals for any line-transect surveys conducted within the region that have recorded sightings of marine mammals, including Mediterranean monk seals, during the dedicated survey effort or opportunistically. This included experts working in the Mediterranean Sea and Black Sea (see Table 1 and Table 2 in the main report).

We also identified experts conducting research specifically on the Mediterranean monk seal from past collaborations and the scientific literature. This included reaching out to contacts starting in February 2022, including:

1. Archipelagos - Environment and Development (NGO; Luigi Bundone, Aliki Panou)
2. Archipelagos Institute of Marine Conservation (Beatriz Tintoré)
3. Biodiversity Conservation Foundation - Fundación CBD-Hábitat (Fernando Aparicio, Soledad Centenera Martín, Pablo Fernández de Larrinoa)
4. Cyprus Department of Fisheries and Marine Research (DFMR), Ministry of Agriculture, Rural Development and Environment (Marina Argyrou, Melina Marcou, Vassilis Papadopoulos, Lavrentios Vasiliades)
5. Fondazione Acquario di Genova (Michela Bellingeri, Guido Gnone)
6. HDR, Inc. (Daniel Engelhaupt)
7. Italian Institute for Environmental Protection and Research (ISPRA; Caterina Fortuna, Giulia Mo)
8. Malta Environment and Planning Authority, Environment Protection Directorate (MEPA; Carmen Misfud)
9. Marine Conservation and Research (Oliver Boisseau)
10. Marine Mammals Research Association (DMAD; Aylin Akkaya)
11. Middle East Technical University Institute of Marine Sciences (Ali Cemal Gücü, Meltem Ok)
12. MIRACETI (Céline Tardy, Hélène Labach)
13. MOm/Hellenic Society for the Study and Protection of the Monk Seal (Panos Dendrinos, Alexandros Karamanlidis)
14. Pelagos Cetacean Research Institute (Voula Alexiadou, Alexandros Frantzis)
15. Tethys Research Institute (Joan Gonzalvo, Simone Panigada)
16. US Navy (Joel Bell, Danielle Jones)
17. Zonguldak Bülent Ecevit University (Nastassia Uludüz)

We also searched the published and available literature and online data repositories for information on the presence or distribution of Mediterranean monk seals, and any ongoing or planned research, that have the potential for supporting future development of density estimates for the US Navy NMSDD. This included searching for published literature by using the search string "Mediterranean monk seal" within the Clarivate's Web of Science abstract and citation database (conducted on 16 January 2024, resulting in 196 unique records), and Google Scholar (conducted on 1 February 2024, resulting in 33,100 where we selected the top 20 results when sorted by relevance and top 20 results from searching abstracts of articles added in the last year were sorted by date). For online data archives, the most current collection of georeferenced observations available within the Ocean Biodiversity Information System (OBIS) and (Spatial Ecological Analysis of Megavertebrate Populations) OBIS-SEAMAP data repositories, Important Marine Mammal Areas (IMMAs) defined by the process led by the Marine Mammal Protected Areas Task Force, and estimated geographic extents were also downloaded and the available data were summarized.

3. Results

The collection of line transect surveys provided by 12 survey entities for Mannocci et al. (2018) covered 302,481 km of effort, but contained large spatial and temporal gaps in survey coverage within the Mediterranean Sea and did not contain any reports of Mediterranean monk seal sightings. The collection of over 200 aerial and shipboard line transect surveys, gathered for updated marine mammal density models in the Mediterranean and Black Seas for the US NMSDD, contained 16 records of Mediterranean monk seal sightings with a total estimated group size of 21 individuals while on-effort (Table G-1). Three survey entities (Archipelagos Institute of Marine Conservation, Marine Conservation and Research, and Tethys Research Institute) recorded observations within nine shipboard surveys conducted within the Aegean Sea, Levantine Sea, and Ionian Sea/Central Mediterranean. Total on-effort survey track was estimated as 21,241 km, in mostly coastal waters (Figure G-1).

Table G-1. Details of Mediterranean line transect surveys conducted by ship that recorded Mediterranean monk seal sightings. Subregions based on Notarbartolo di Sciara (2016) and UNEP-MAP-RAC/SPA (2010). Records = unique date/time and location; number = summed group size estimate for the record; effort = total estimated distance of survey tracks based on connecting track points using the European Terrestrial Reference System 1989 ensemble (ETRS 1989 LAEA) projection within ArcGIS Pro 3.1.3.

Entity	Years	Months	Subregion	Records	Number	Effort (km)
Archipelagos Institute of Marine Conservation	2018, 2021	7, 8, 10	Aegean Sea	4	4	16,727
Marine Conservation and Research	2016	11	Levantine Sea	1	1	204
Tethys Research Institute	2014 - 2016	6 - 9	Ionian Sea/Central Mediterranean	11	16	4,310

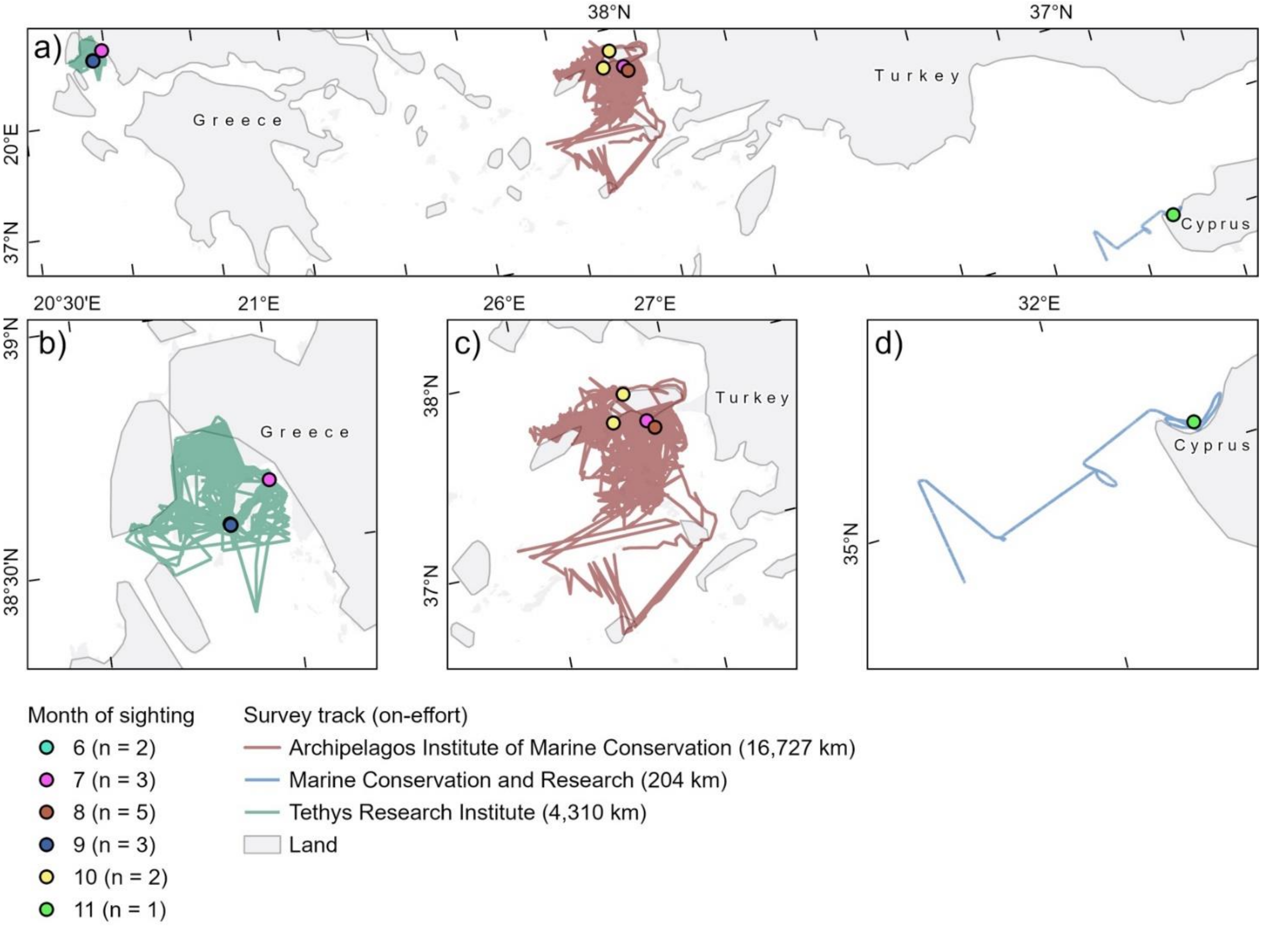

Figure G-1. The number of Mediterranean monk seal sightings recorded per month during shipboard line transect surveys in the a) Mediterranean Sea, collected by three entities between 2014 and 2021: b) Tethys Research Institute surveys near Greece, c) Archipelagos Institute of Marine Conservation surveys near Turkey, and d) Marine Conservation and Research surveys near Cyprus. Land layer source: US Navy.

A total of 203 unique references were found using Web of Science and Google Scholar, published from 1975–January 2024. Excluding the one reference published in 2024, there was a significant increase in the number of references published over time (linear regression; p = 0.00001, Figure G-2). Within the most recently published references (published between 2018–2024, n = 72), the review of titles and abstracts did not reveal many additional studies, beyond what was discovered for Mannocci et al. (2018), that described Mediterranean monk seal observations or estimated abundance or density data from dedicated line transect surveys covering the majority of the Mediterranean and Black Seas. We conducted supplemental searches and opportunistically added any relevant reference we found by using Google, reviewing the list of citations within relevant references, and collecting those directly contributed from the Mediterranean monk seal experts that we had contacted through email for Mediterranean monk seal information.

Within our limited collection of references, there were published studies in a few regions within the Mediterranean Sea that have reported in-water observations from land-based or vessel surveys (e.g., Glarou et al. 2022; Pietroluongo et al. 2022), opportunistic sightings (e.g., Gerovasileiou et al. 2017; Pietroluongo et al. 2022), and observations from coastal surveys (e.g., Giakoumi et al. 2013; Pietroluongo et al. 2022). Research on Mediterranean monk seals have mostly been conducted for the eastern populations, with heterogeneous spatial and temporal coverage resulting in descriptions of sites with evidence of use, suitable sites, and potential sites. For example, a total of 7 pupping sites and 10 resting were found after surveying 370 kilometers (km) of the Cyprus coastline in 2009-2018 (Beton et al. 2021), while surveys around the Gyaros coast found 3 suitable caves for pupping and resting, 5 suitable caves for resting and 3 resting and possible pupping sites (Dendrinos et al. 2008). Interviews have also provided information to fill gaps of reported sightings in remote locations (Mo et al. 2007, 2011). Additionally, research using eDNA methods have been explored to help define and monitor Mediterranean monk seal distribution, which could help to supplement knowledge on these populations (e.g., Valsecchi et al. 2022, 2023)

In the past 10 years, Mediterranean monk seal populations showed that they were on the path to recovery, with increasing abundances, and is now classified as "Vulnerable" under the IUCN Red List (Karamanlidis et al. 2023; Karamanlidis 2024). Most recently, records beyond their previously restricted range have been published, including Albania (Bundone et al. 2022), Libya (Alfaghi et al. 2013), the Gaza Strip, Palestine (Kingsley 2023; Fattah et al. 2023; Fattah and Abd Rabou 2023), and Greece (Dendrinos et al. 2008; Nicolaou et al. 2021). A collection of sightings reported from 2000 to 2014, covering a large portion of the Mediterranean Basin, showed that populations could be spreading based on the presence of individuals in areas outside of the Aegean Sea and northern Levantine Sea, where Mediterranean monk seals were previously determined as extinct (Bundone et al. 2019). Establishing or continuing research with systematic monitoring would be critical to determine if the upward trend continues and if their geographic range expands.

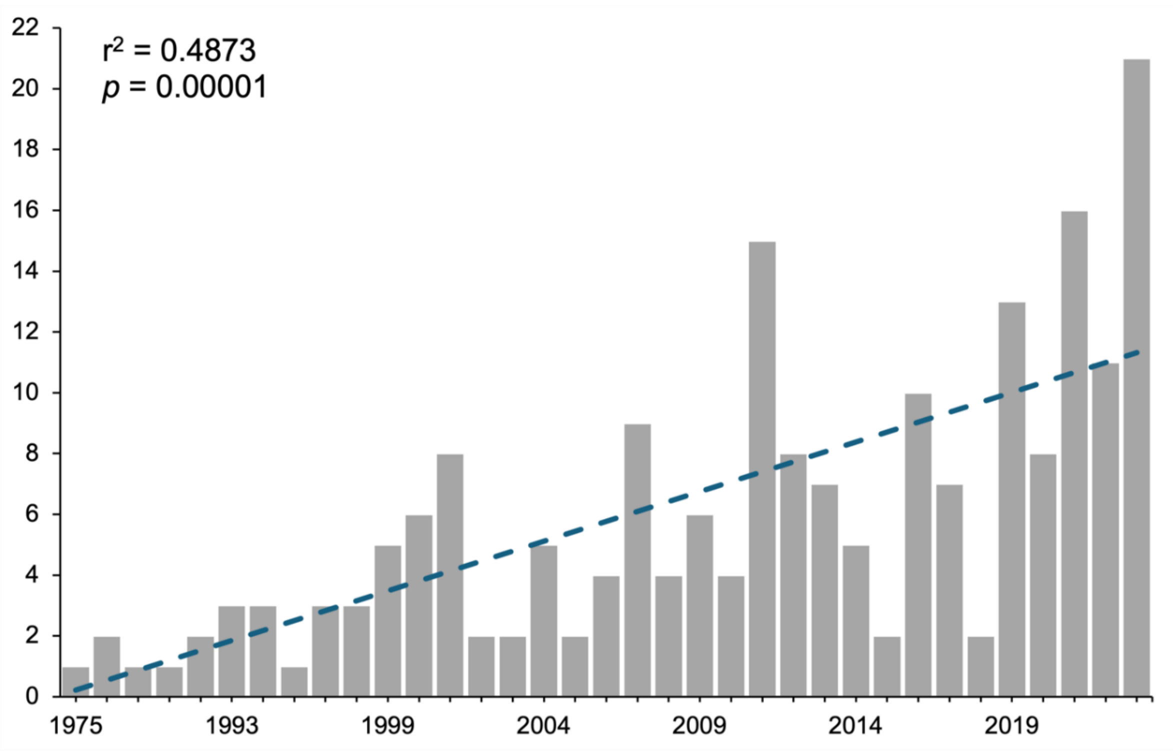

Figure G-2. The number of unique references published by year, available through Web of Science and results from the most top relevant results through Google Scholar.

Currently, the OBIS database contains 20 observations with only 2 observations within the Mediterranean or Black Seas; one observation was a museum record from 1880 within their estimated historic distribution in the Tyrrhenian Sea / eastern Ligurian Sea (Halpin et al. 2009; Robertson 2020) while the other observation in the eastern Mediterranean was recorded in 2007 (Halpin et al. 2009; Boisseau 2014). Limited data contributed to both OBIS and OBIS-SEAMAP may be a result of the lack of available information and/or the lack of participation from the Mediterranean monk seal research community to archive observations within the online data repository. Public reports of Mediterranean monk seal presence and the exact locations of their habitats are usually protected because this sensitive information could put them at risk to human activities targeting to harm them (Karamanlidis et al. 2016). Collaboration and trust among ongoing projects monitoring populations in separate regions (e.g., SAD-AFAG Underwater Research Society – Mediterranean Seal Research Group [https://sadafag.org/en/projects/]) is critical to understanding the status of Mediterranean monk seals in the US Navy's area of interest.

As of March 2024, the Marine Mammal Protected Areas Task Force has identified a total of 280 IMMAs and 185 areas of interest (AOIs), with 25 IMMAs in the Mediterranean Sea region and 15 IMMAs in the Black Sea, Turkish Straits System and Caspian Sea region (IUCN MMPATF 2024). However, the Mediterranean monk seal was listed as the qualifying species for only eight IMMAs (Akamas and Chrysochou Bay, Akrotiri, Central Aegean, Chios and Turkish Coast, Cilician Basin, Ionian Archipelago, Northern Coast of Cyprus, and Northern Sporades IMMAs) and listed as the supporting species for four IMMAs (Coastal Shelf Waters of the South East Levantine Sea, Gulf of Corinth, Hellenic Trench, and Northern Coast and Islands of the Thracian Sea IMMAs) in the Mediterranean region (Tetley et al. 2022; IUCN MMPATF 2023). Mediterranean monk seals were also listed as a supporting species for two additional candidate IMMAs and 12 areas of interest (Tetley et al. 2022; IUCN MMPATF 2023). All areas that mentioned Mediterranean monk seals were identified in the eastern and central Mediterranean areas (Ionian Sea / Central Mediterranean, Aegean Sea, Levantine Sea) and overlapped with either their estimated range distribution (European Red List et al. 2023) or historic distribution (Johnson 1999; Spalding et al. 2007; González 2015; Karamanlidis et al. 2016; Salmona et al. 2022). All areas were identified in coastal areas including the Ionian Sea / Central Mediterranean, Aegean Sea, and the Levantine Sea except for the historic distribution where it spanned all coastal regions in the Mediterranean and Black Seas (Figure G-3).

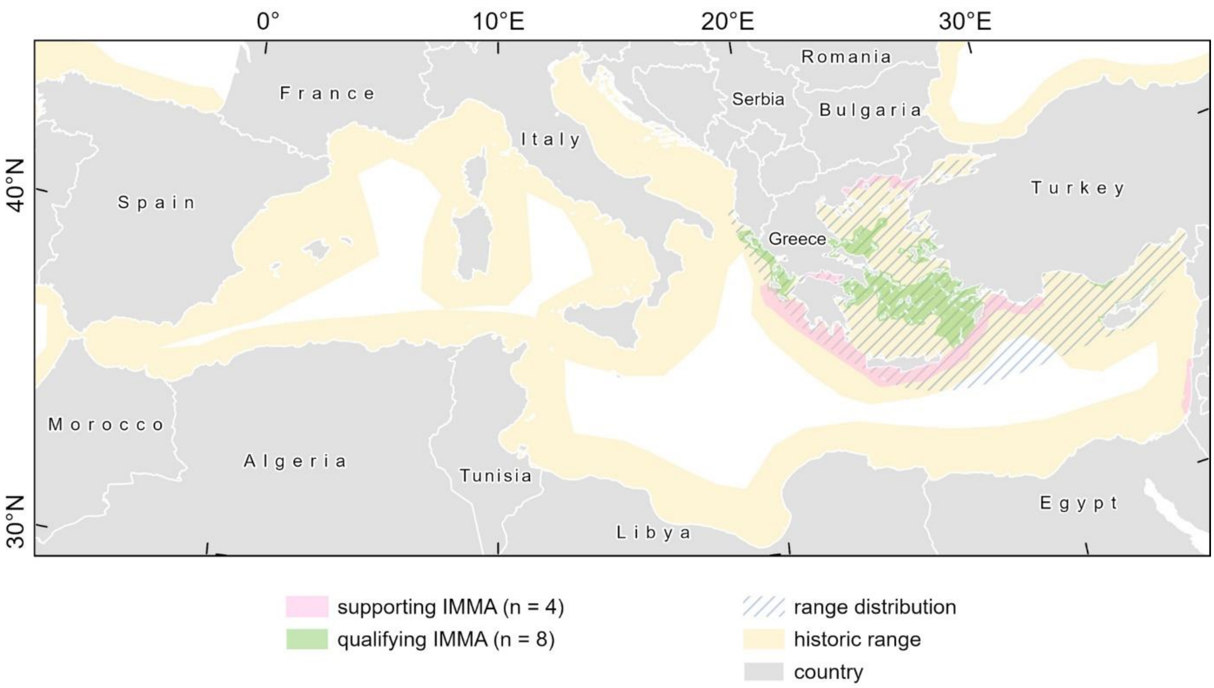

Figure G-3. Historic Mediterranean monk seal distribution (Salmona et al. 2022) and current distribution (Karamanlidis et al. 2019, 2023; European Red List et al. 2023).

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H

Maps of extrapolation tests

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Appendix H: Maps of extrapolation tests

Table of Contents

These maps show:
- NT1 Statistic (any single covariate is out of range: non gray pixels).
- NT2 Statistic (the combination of all covariates is out of range: values >1).
- ExDet Statistic (either a single or a combination of 2 or more covariates are out of range: values <0 mean univariate extrapolation; values >1 mean multivariate extrapolation).

1. Maps of extrapolation tests for the Black Sea

1.1. Bottlenose dolphin

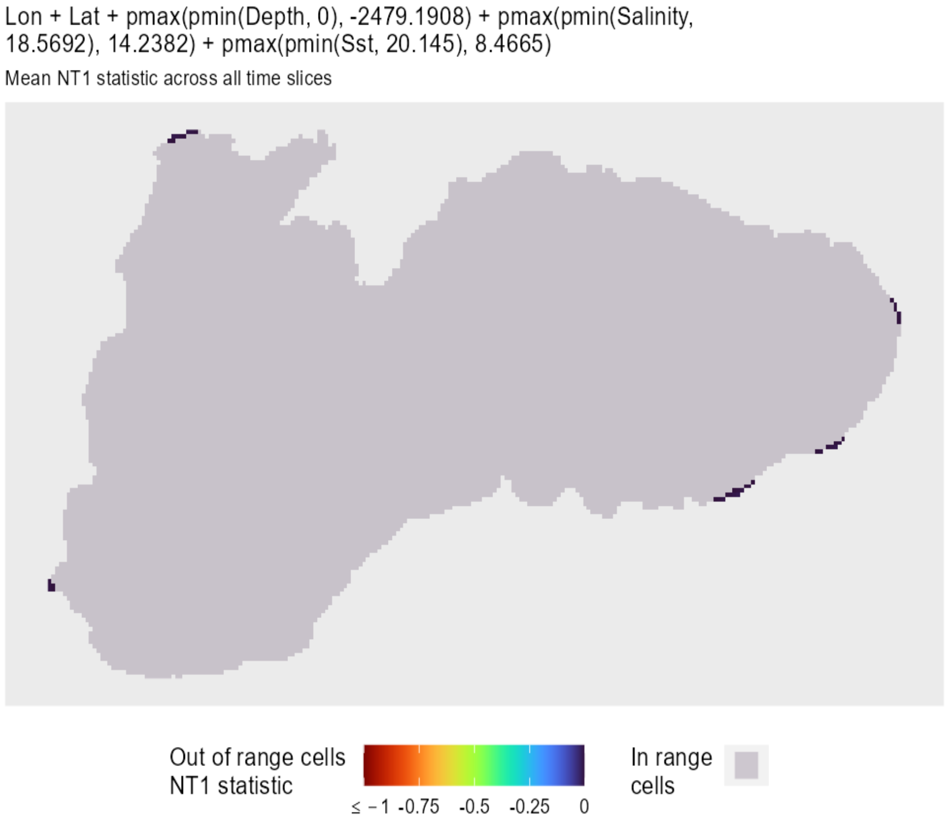

Figure H-1. NT1 statistics for bottlenose dolphin.

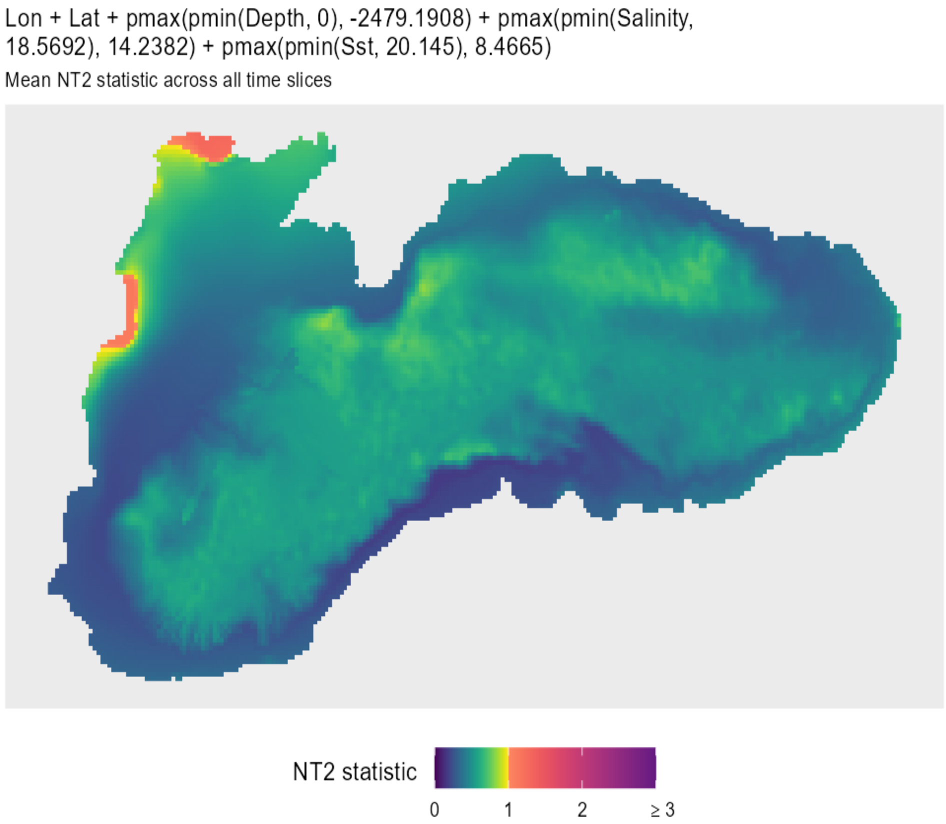

Figure H-2. NT2 statistics for bottlenose dolphin.

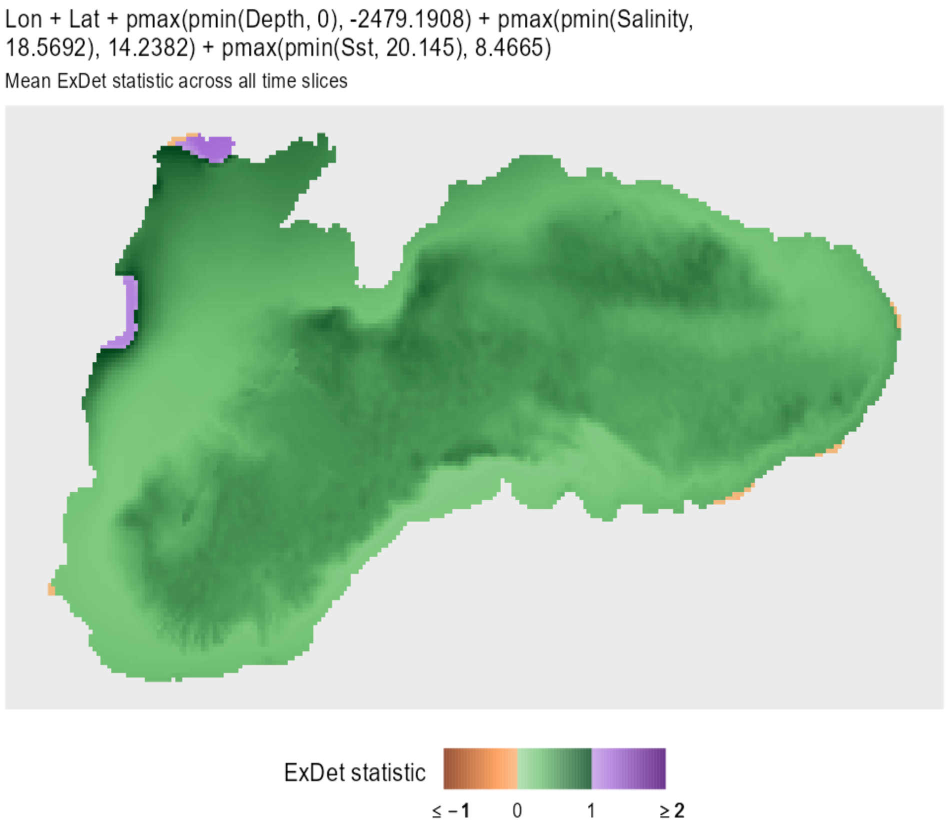

Figure H-3. ExDet statistics for bottlenose dolphin.

1.2. Common dolphin

Lon + Lat + pmax(pmin(Ssh, 0.238), 0.011) + pmax(pmin(Sst, 20.145), 8.4666) + pmax(pmin(Sst_sd, 2.388), 0.2813)

Mean NT1 statistic across all time slices

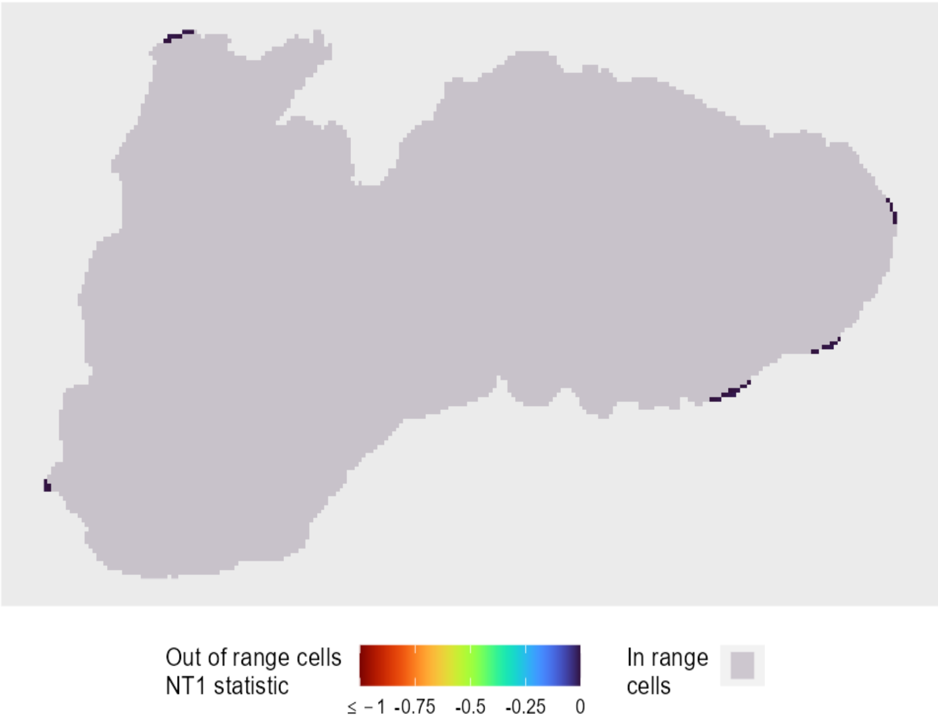

Figure H-4. NT1 statistics for common dolphin.

Lon + Lat + pmax(pmin(Ssh, 0.238), 0.011) + pmax(pmin(Sst, 20.145), 8.4666) + pmax(pmin(Sst_sd, 2.388), 0.2813)

Mean NT2 statistic across all time slices

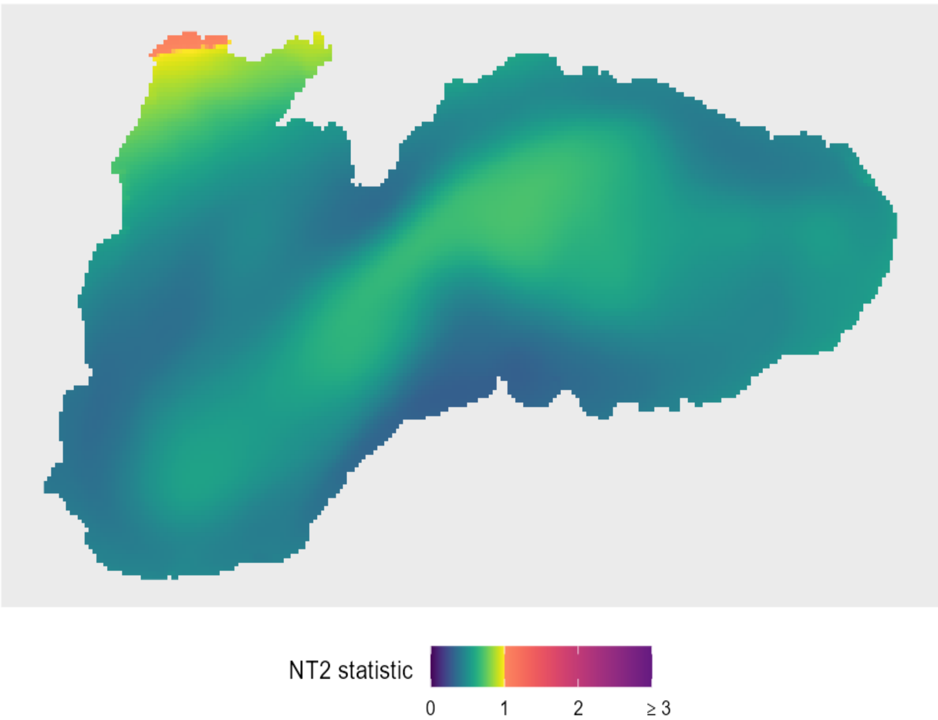

Figure H-5. NT2 statistics for common dolphin.

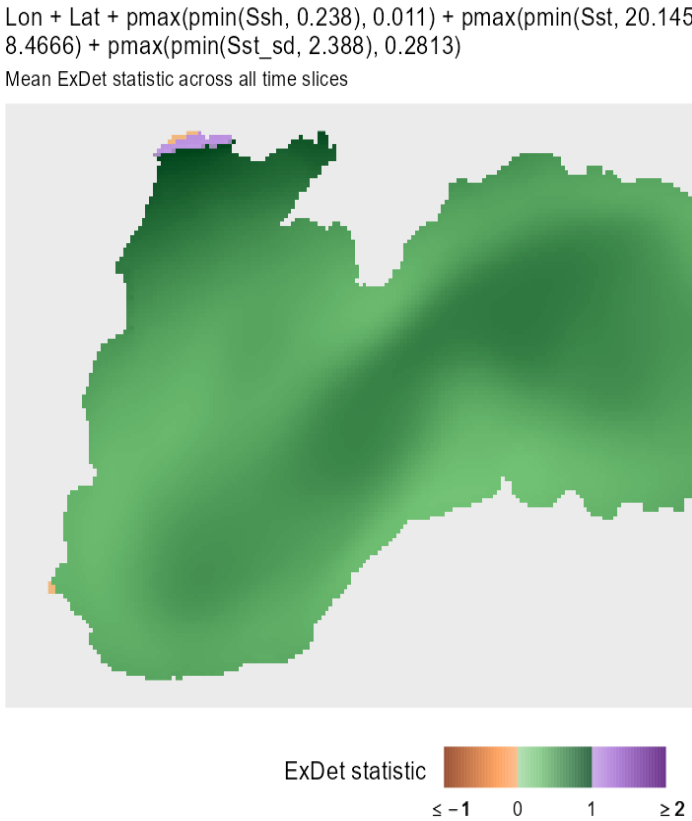

Figure H-6. ExDet statistics for common dolphin.

1.3. Harbor porpoise

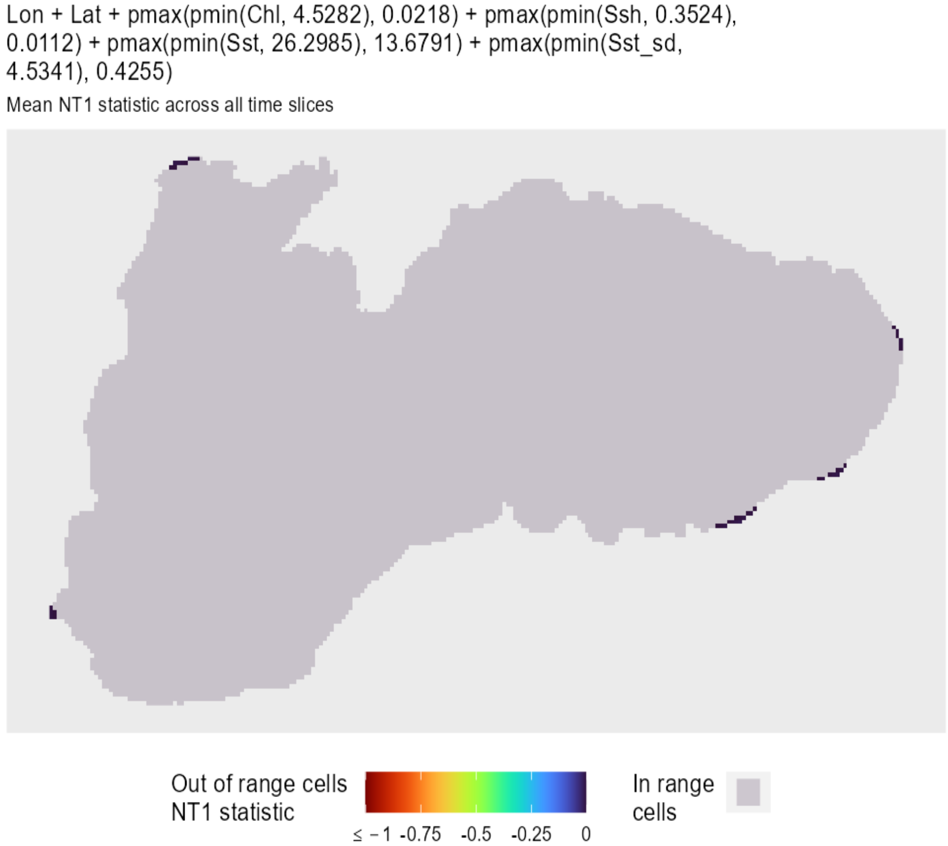

Figure H-7. NT1 statistics for harbor porpoise in summer.

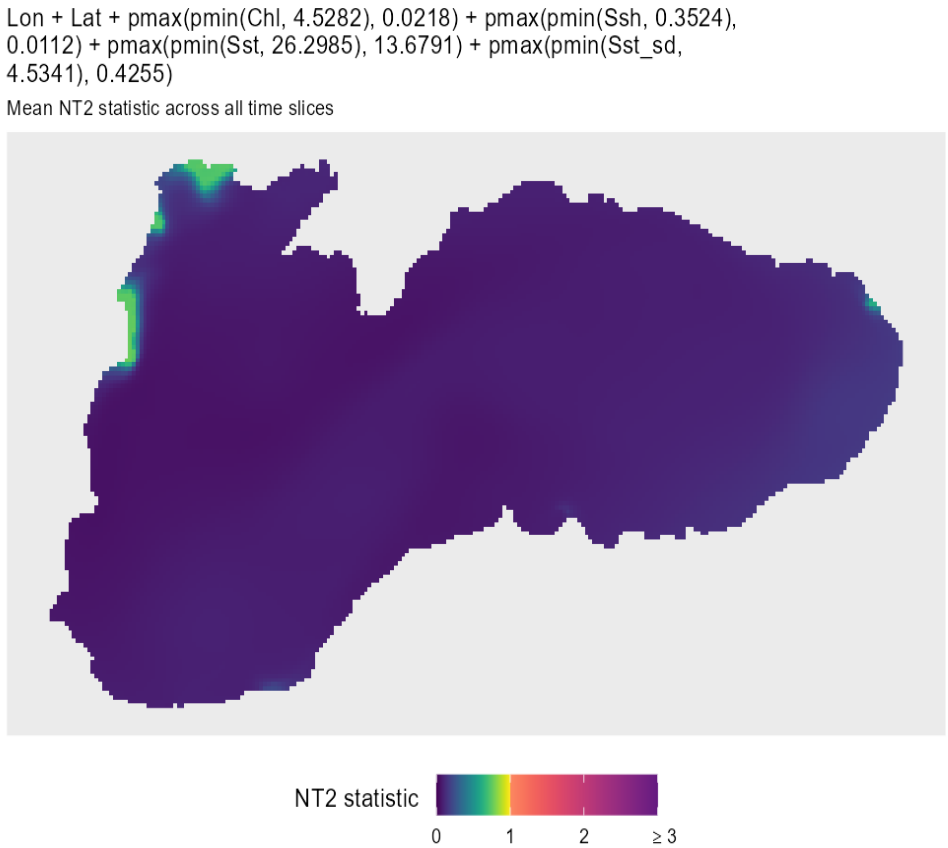

Figure H-8. NT2 statistics for harbor porpoise in summer.

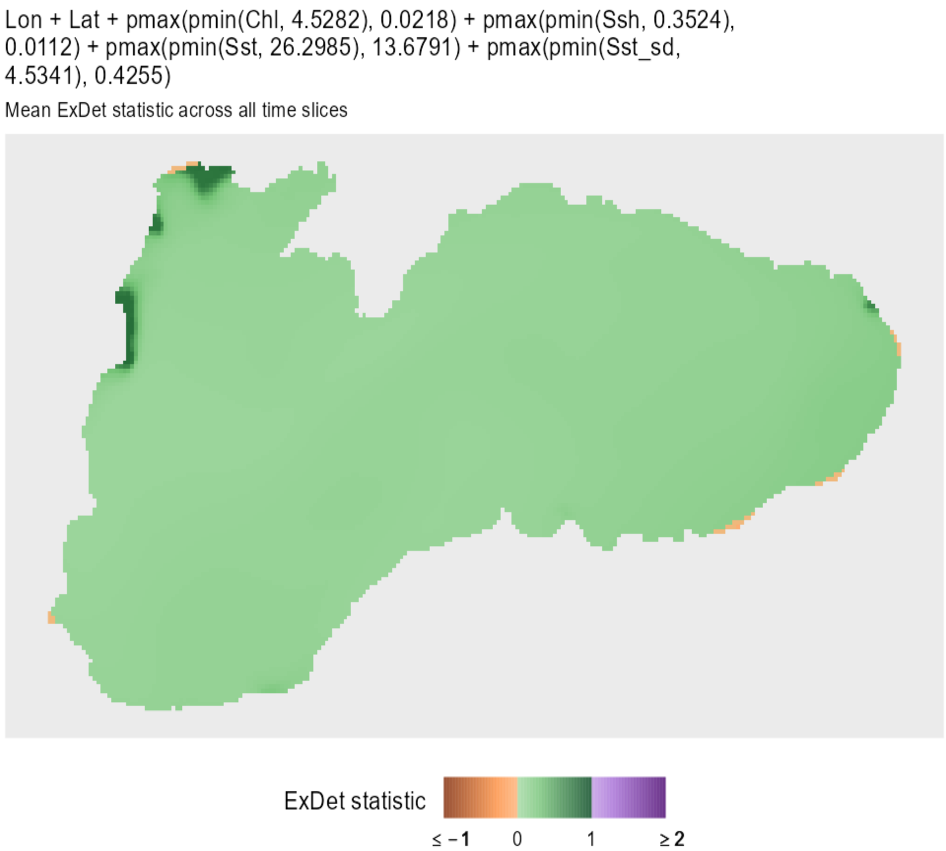

Figure H-9. ExDet statistics for harbor porpoise in summer.

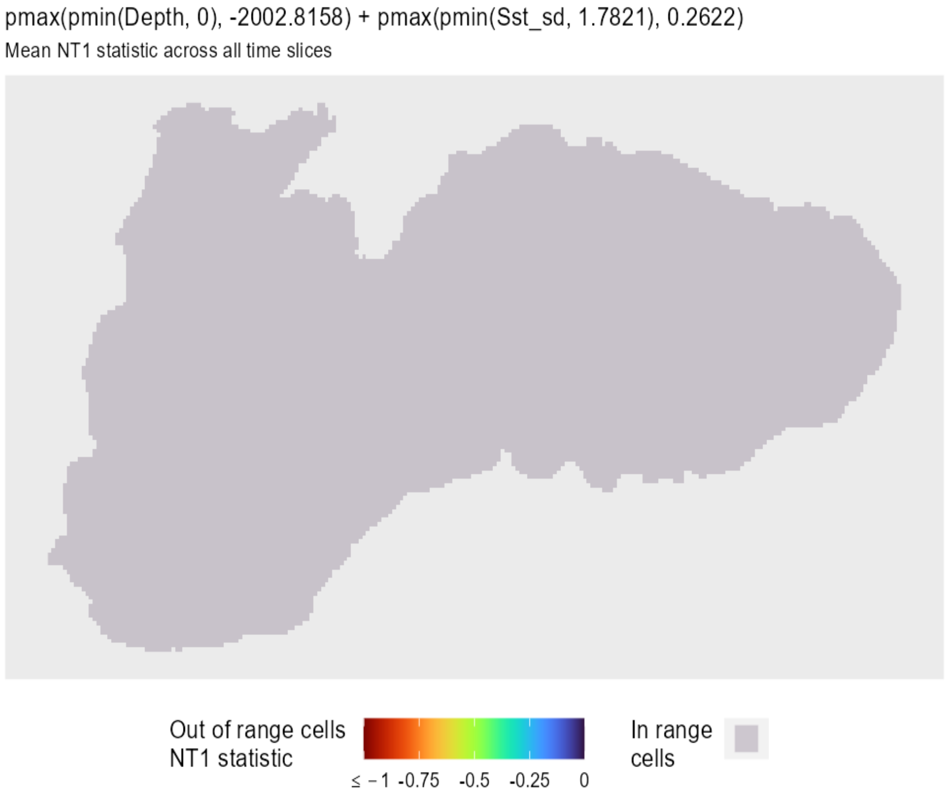

Figure H-10. NT1 statistics for harbor porpoise in winter.

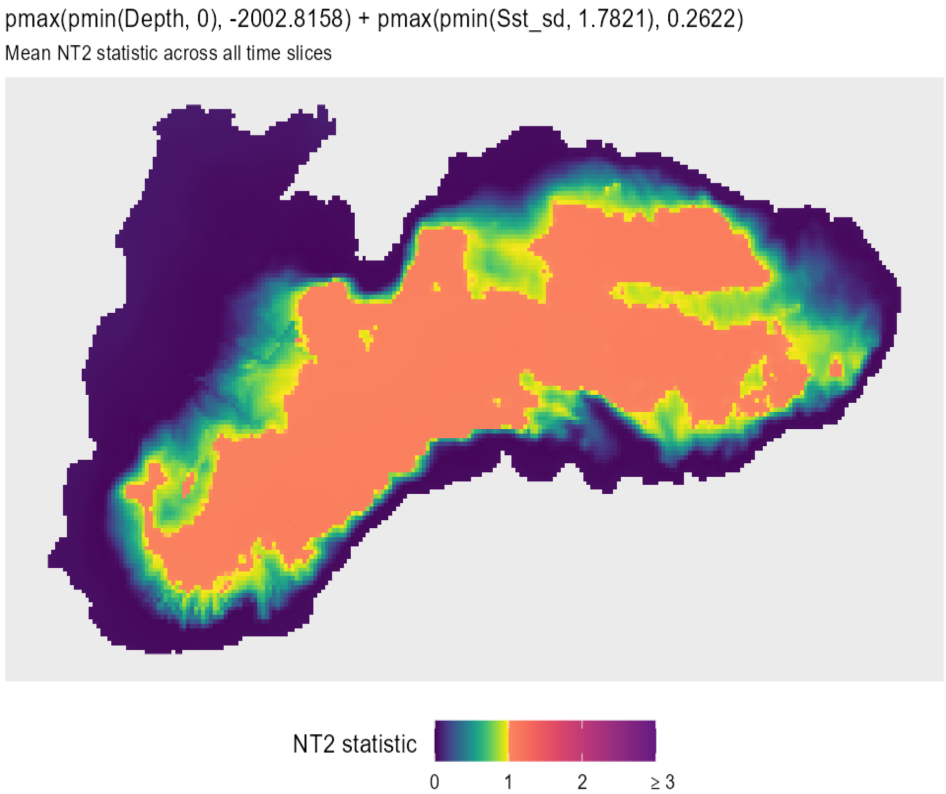

Figure H-11. NT2 statistics for harbor porpoise in winter.

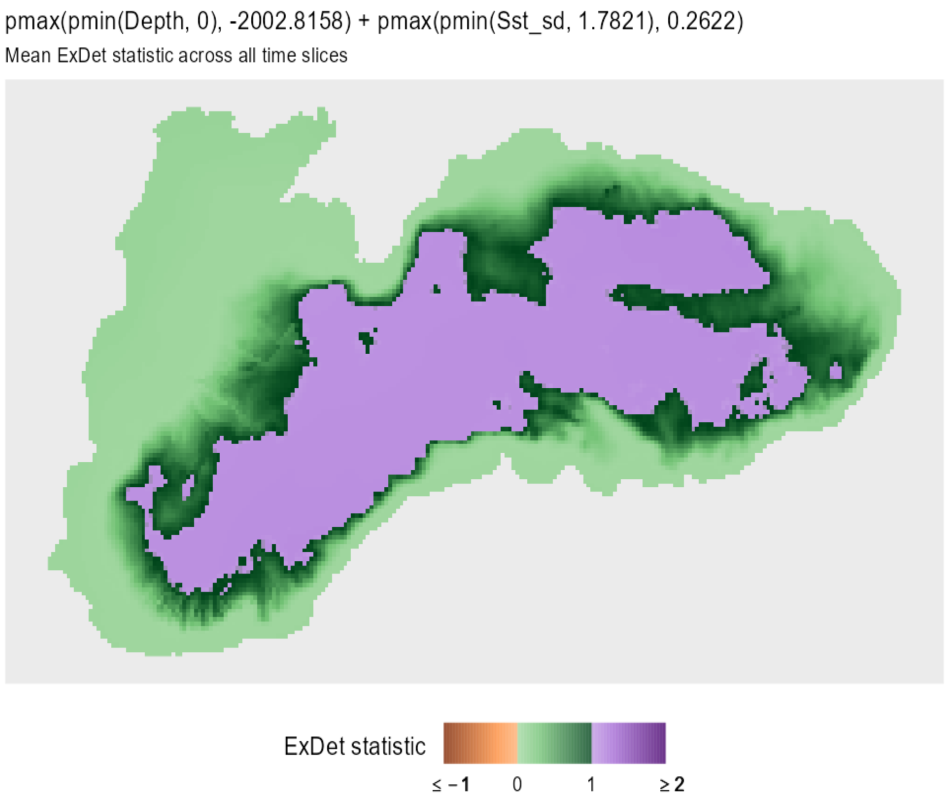

Figure H-12. ExDet statistics for harbor porpoise in winter.

2. Maps of extrapolation tests for the Azov Sea

2.1. Bottlenose dolphin

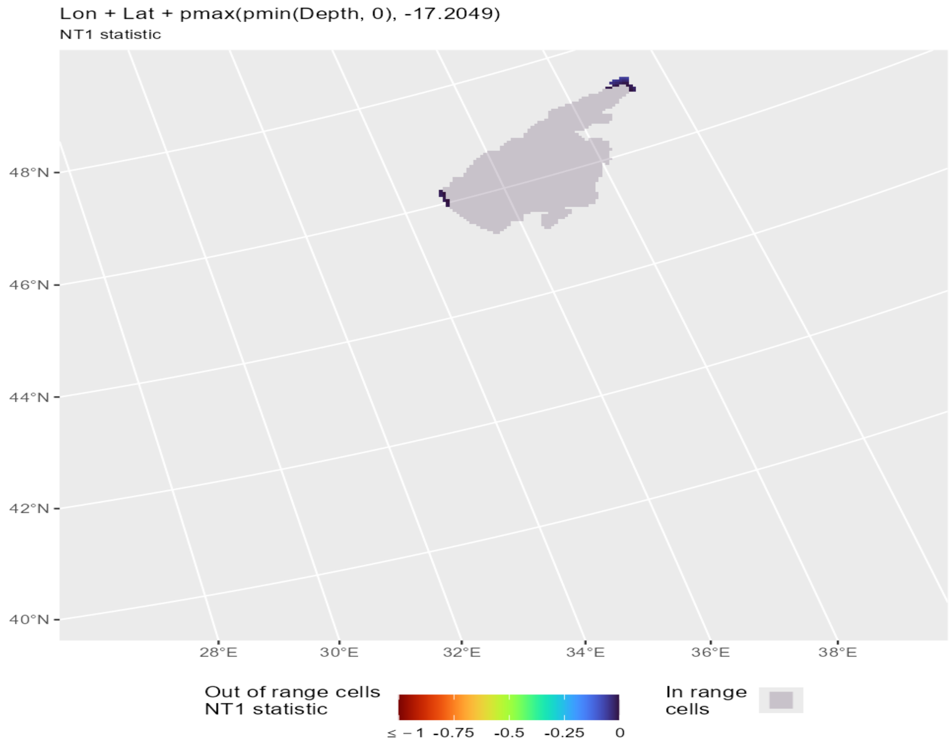

Figure H-13. NT1 statistics for bottlenose dolphin in summer.

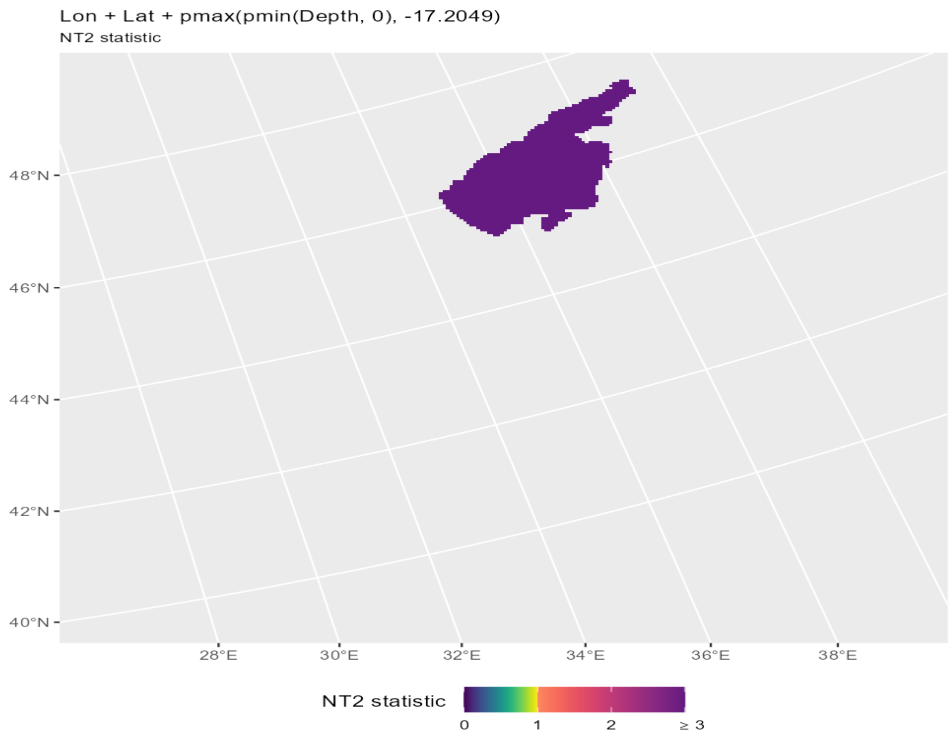

Figure H-14. NT2 statistics for bottlenose dolphin in summer.

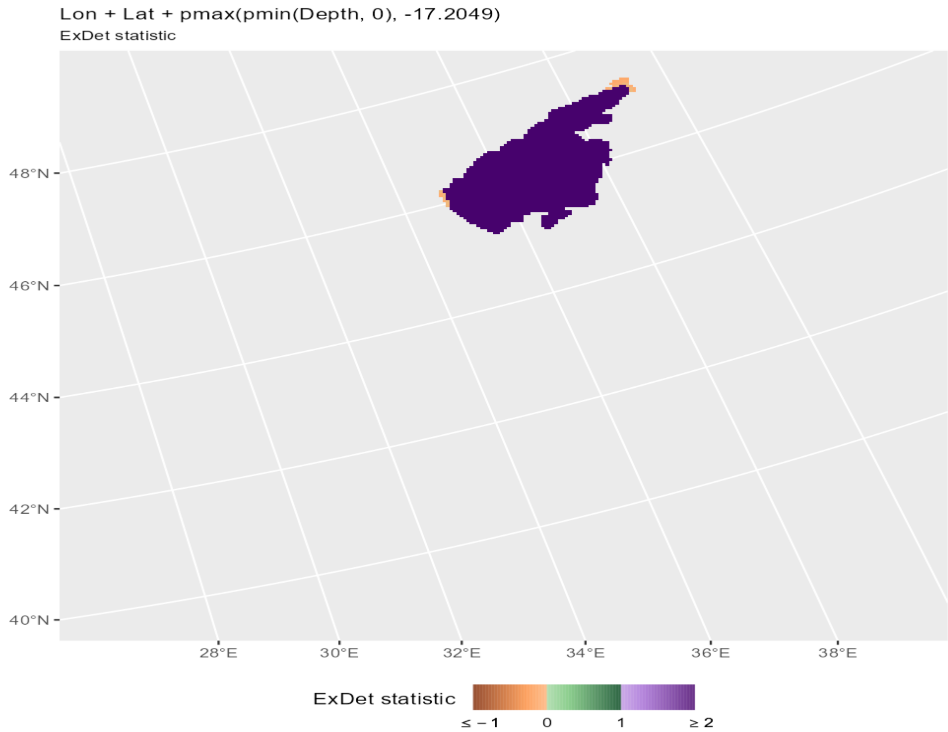

Figure H-15. ExDet statistics for bottlenose dolphin in summer.

2.2. Harbor porpoise

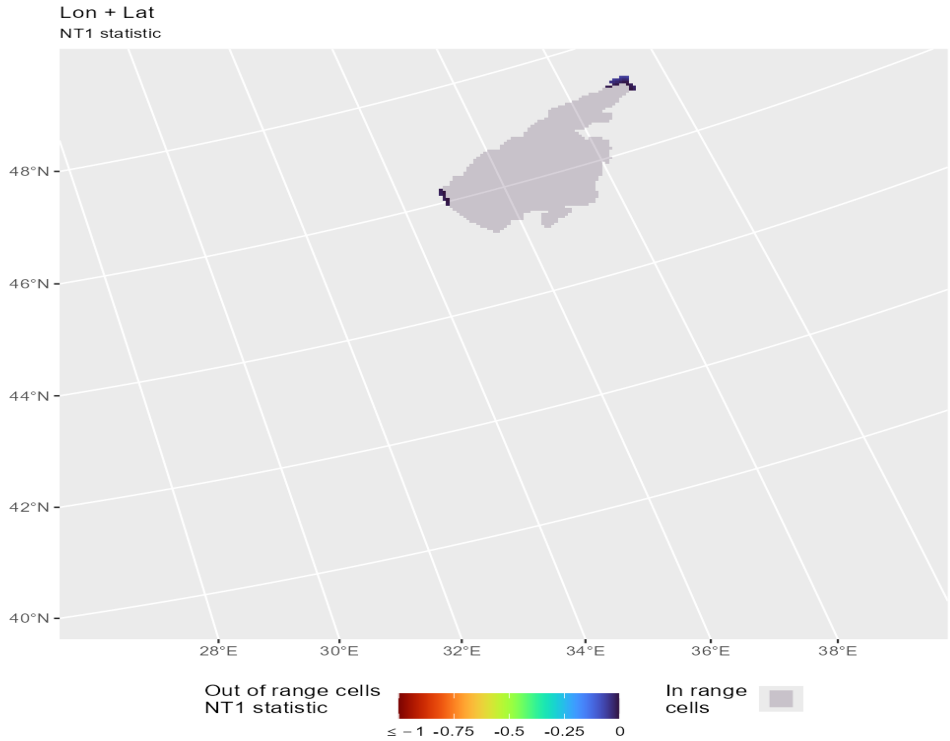

Figure H-16. NT1 statistics for harbor porpoise in summer.

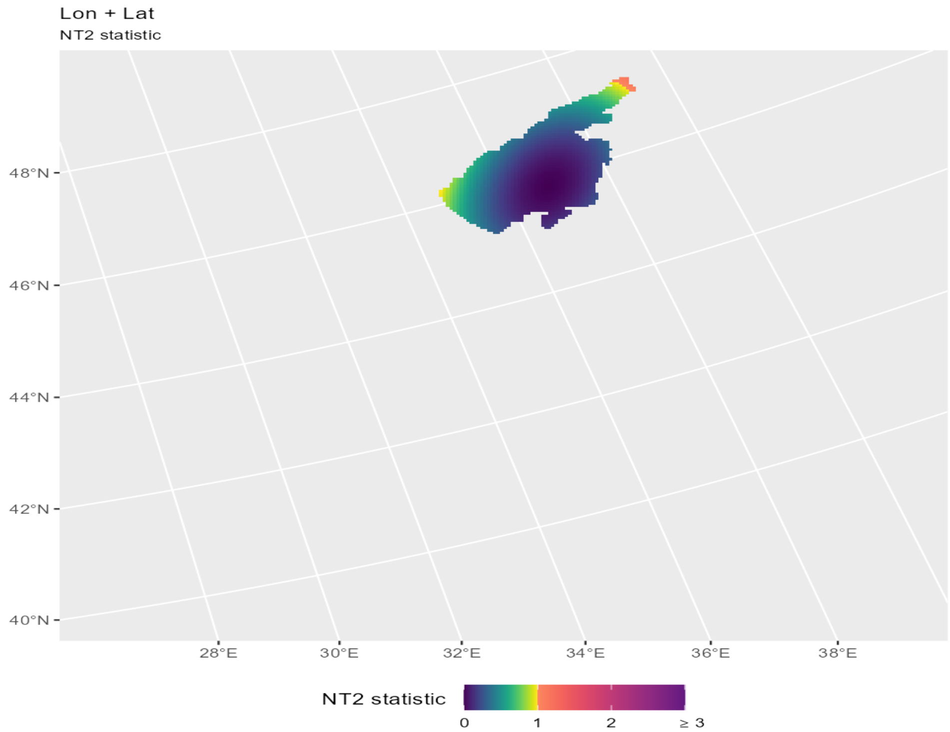

Figure H-17. NT2 statistics for harbor porpoise in summer.

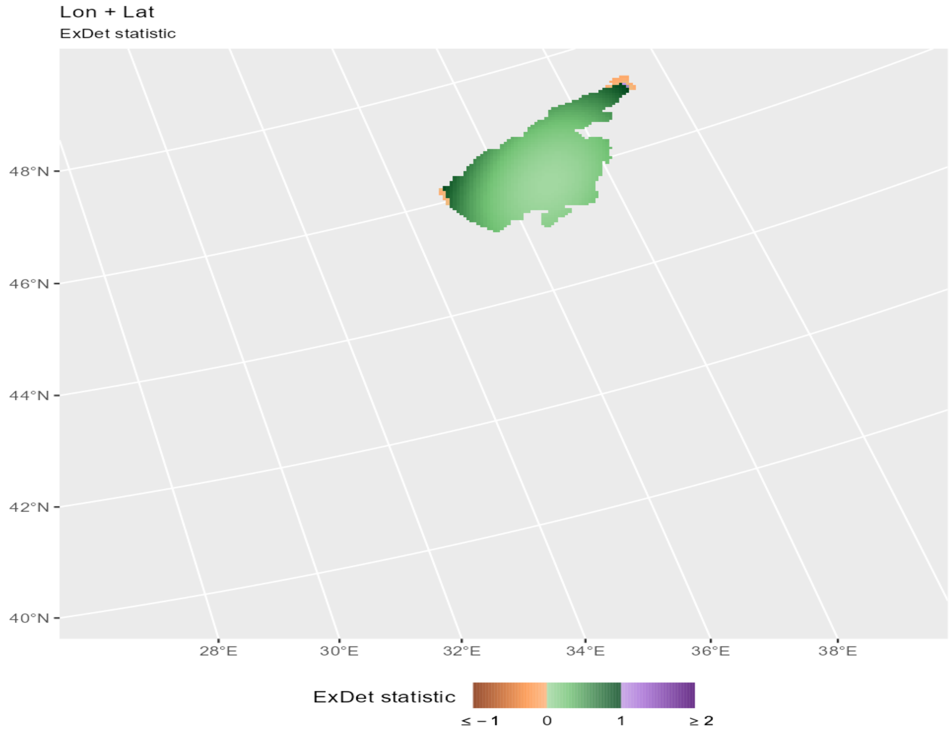

Figure H-18. ExDet statistics for harbor porpoise in summer.

3. Maps of extrapolation tests for the Mediterranean Sea

3.1. Fin whale

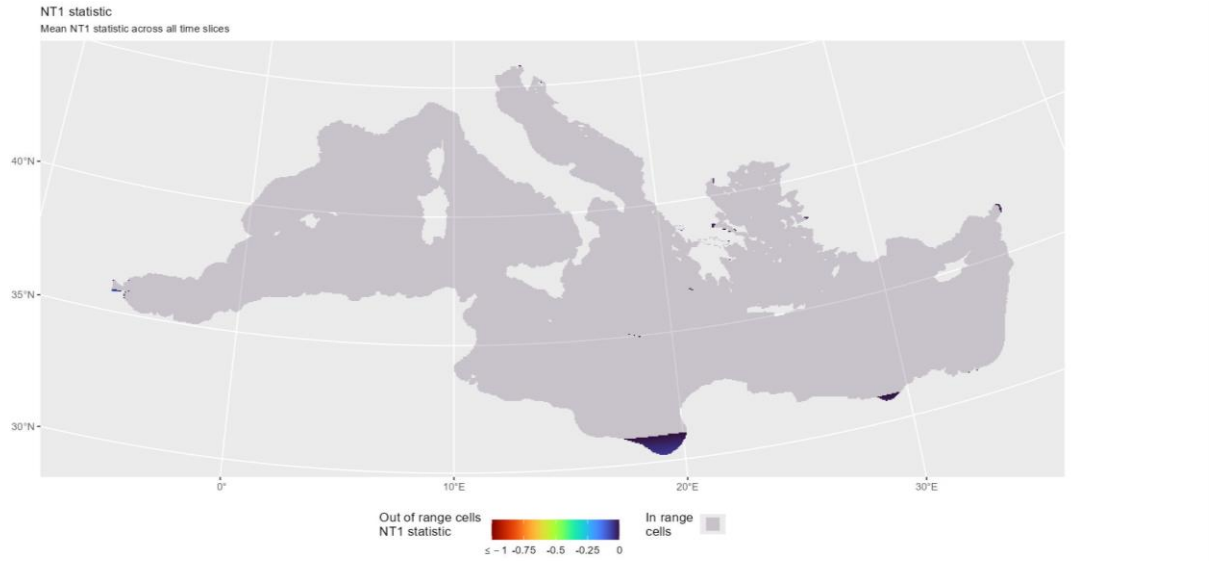

Figure H-19. NT1 statistics for fin whale.

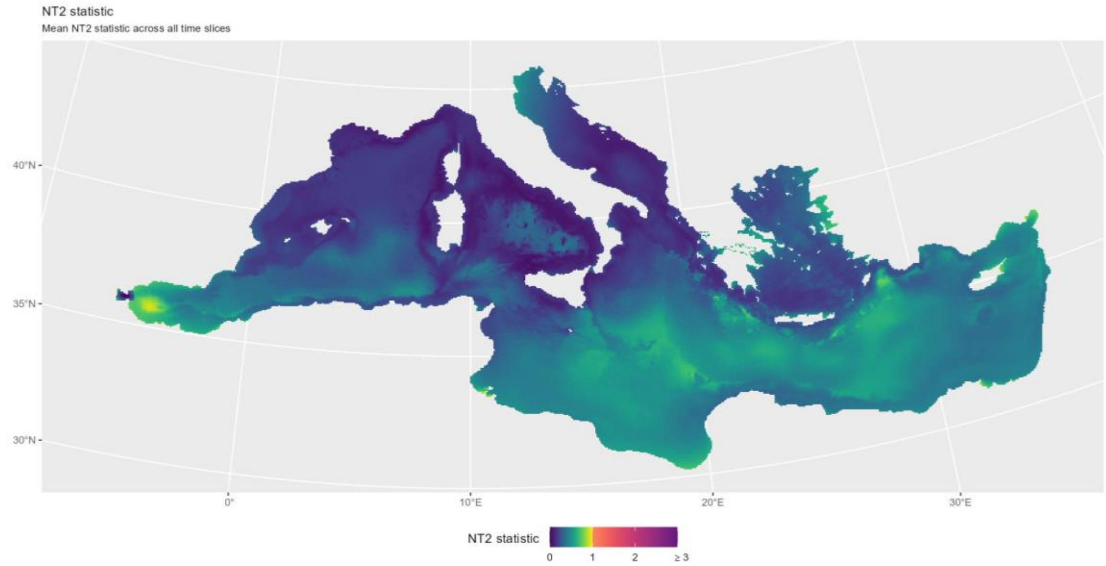

Figure H-20. NT2 statistics for fin whale.

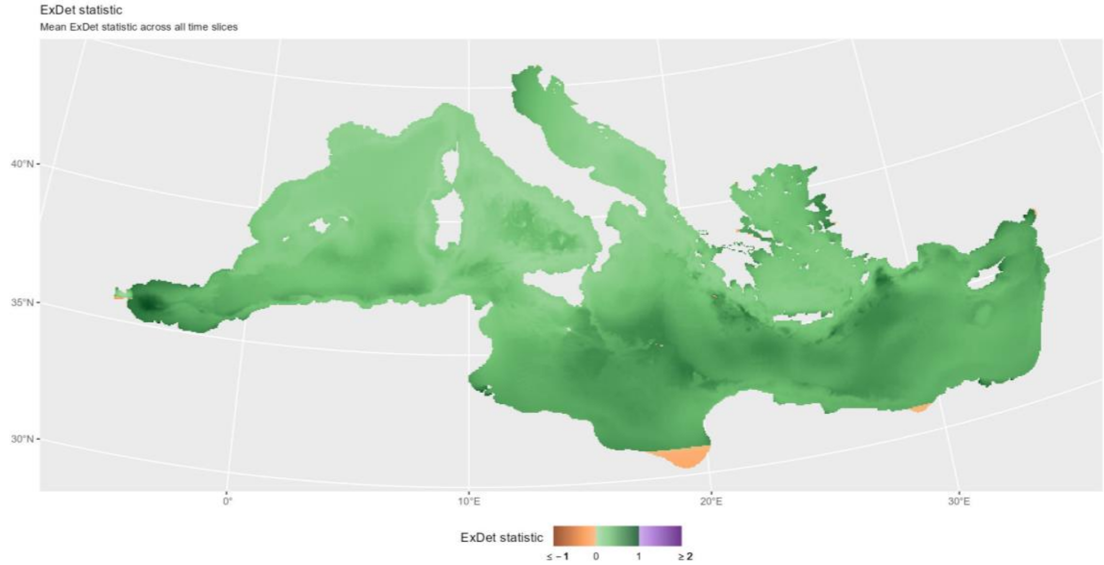

Figure H-21. ExDet statistics for fin whale.

3.2. Sperm whale

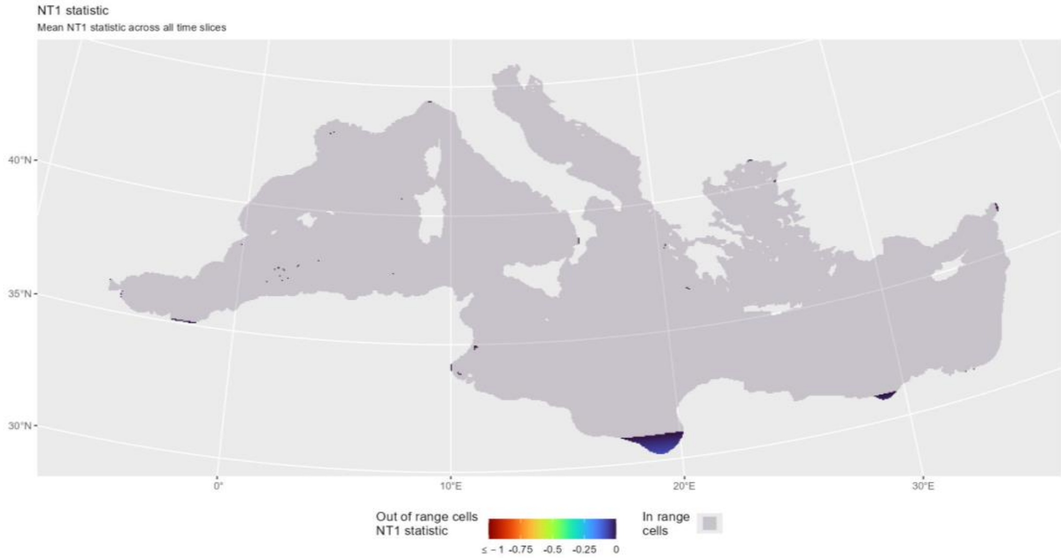

Figure H-22. NT1 statistics for sperm whale in summer.

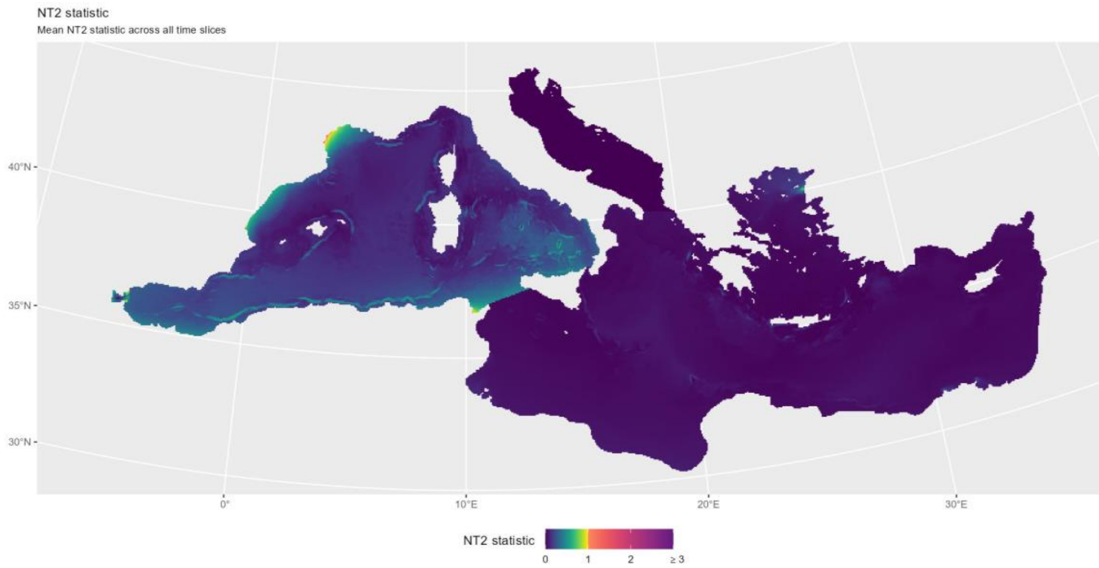

Figure H-23. NT2 statistics for sperm whale in summer.

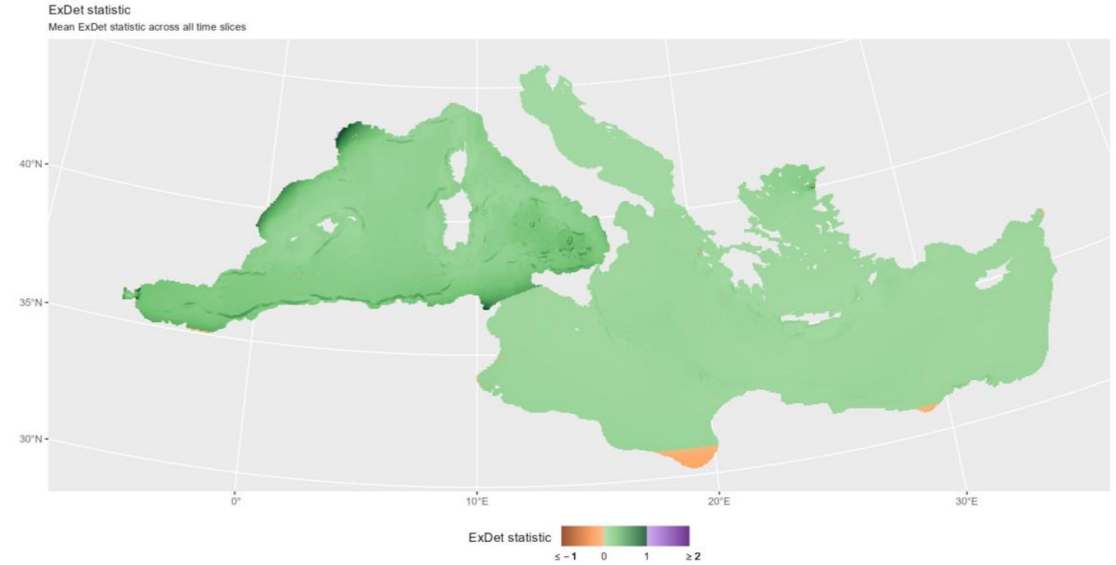

Figure H-24. ExDet statistics for sperm whale in summer.

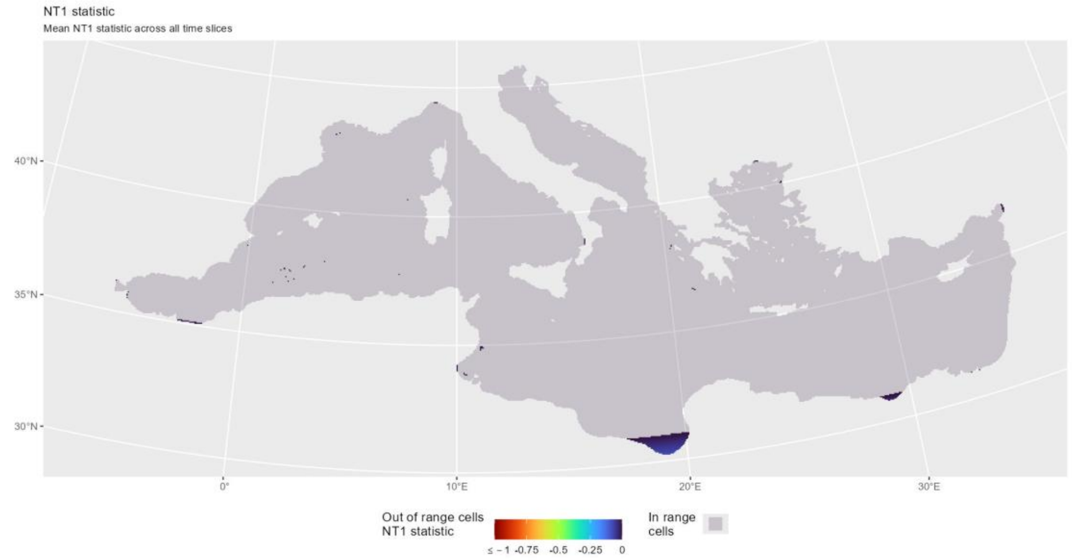

Figure H-25. NT1 statistics for sperm whale in winter.

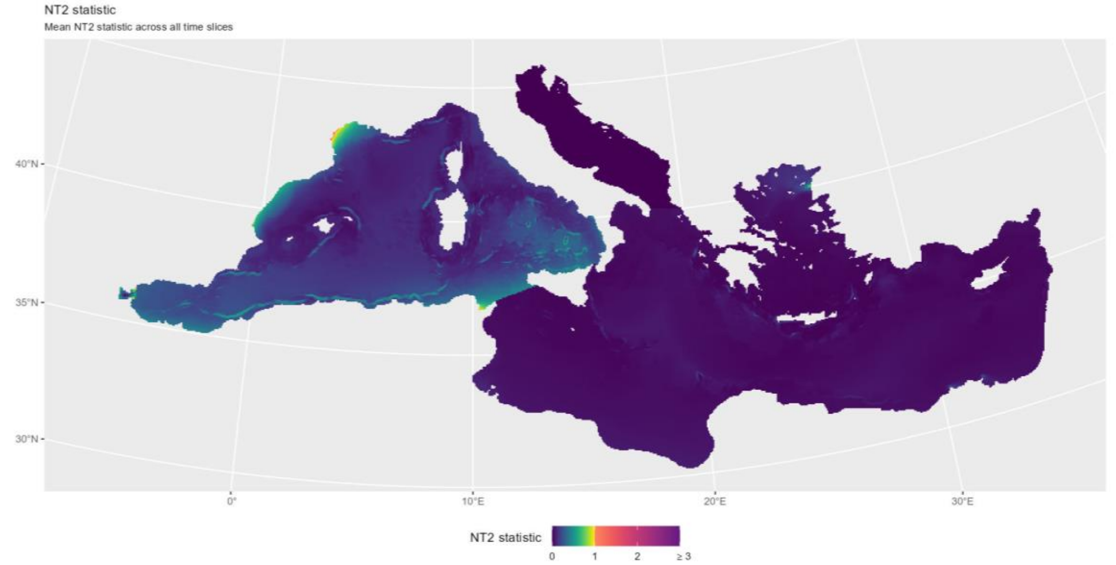

Figure H-26. NT2 statistics for sperm whale in winter.

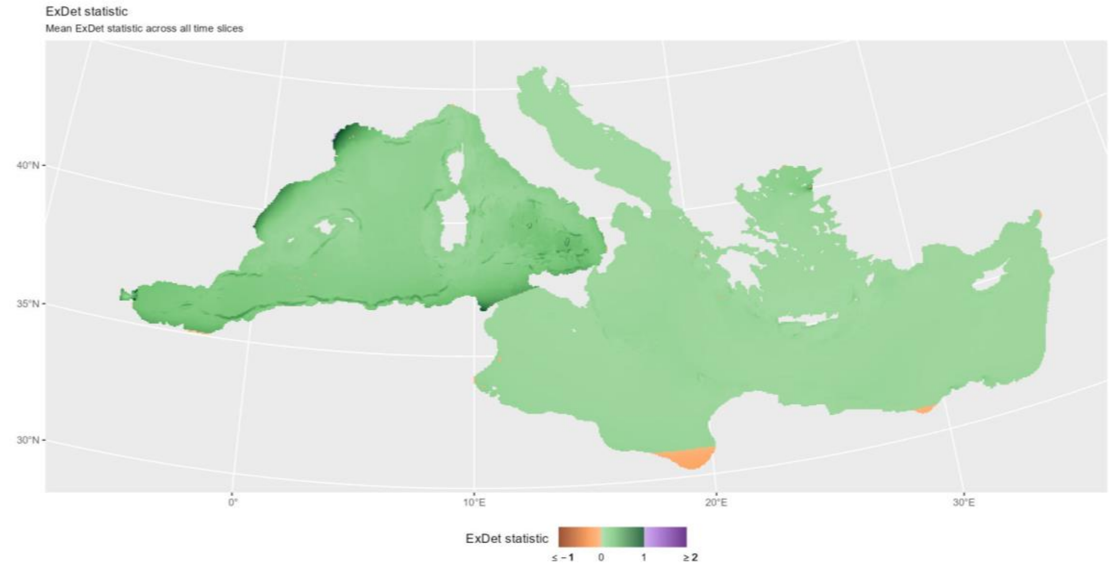

Figure H-27. ExDet statistics for sperm whale in winter.

3.3. Risso's dolphin

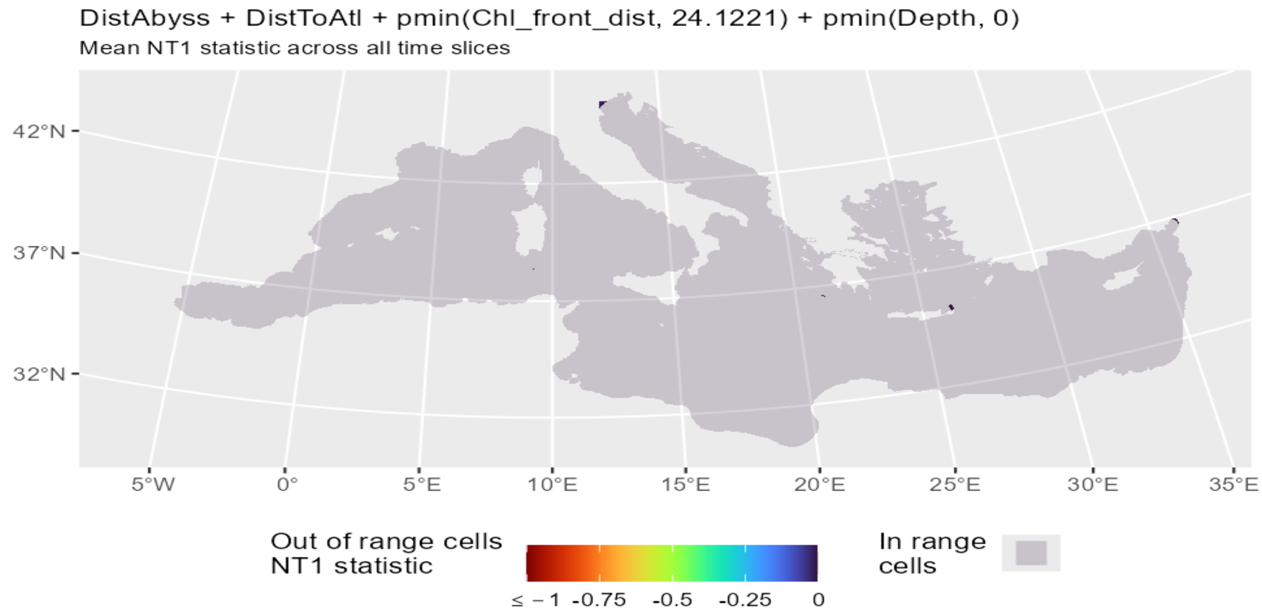

Figure H-28. NT1 statistics for Risso's dolphin.

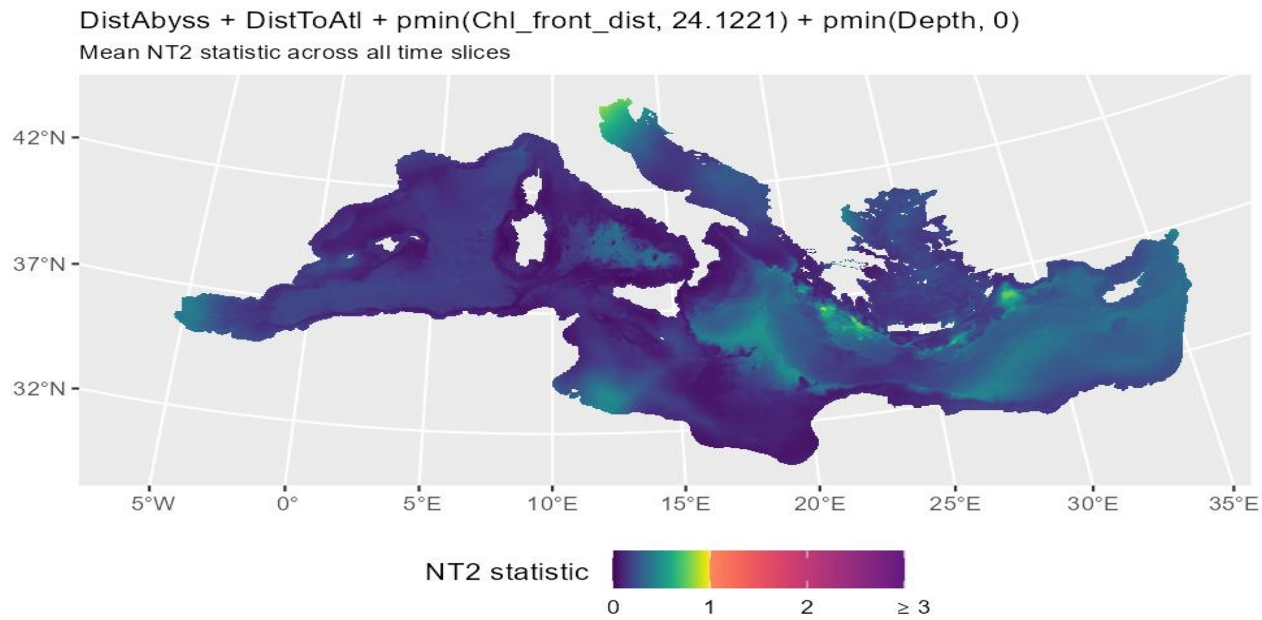

Figure H-29. NT2 statistics for Risso's dolphin.

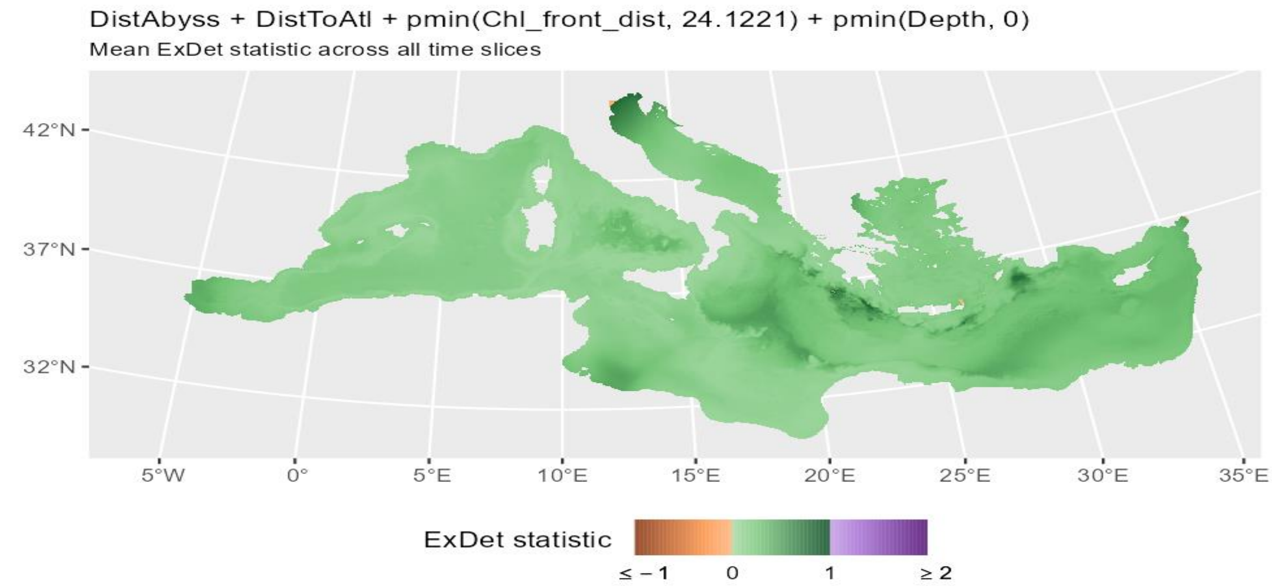

Figure H-30. ExDet statistics for Risso’s dolphin.

3.4. Long-finned pilot whale

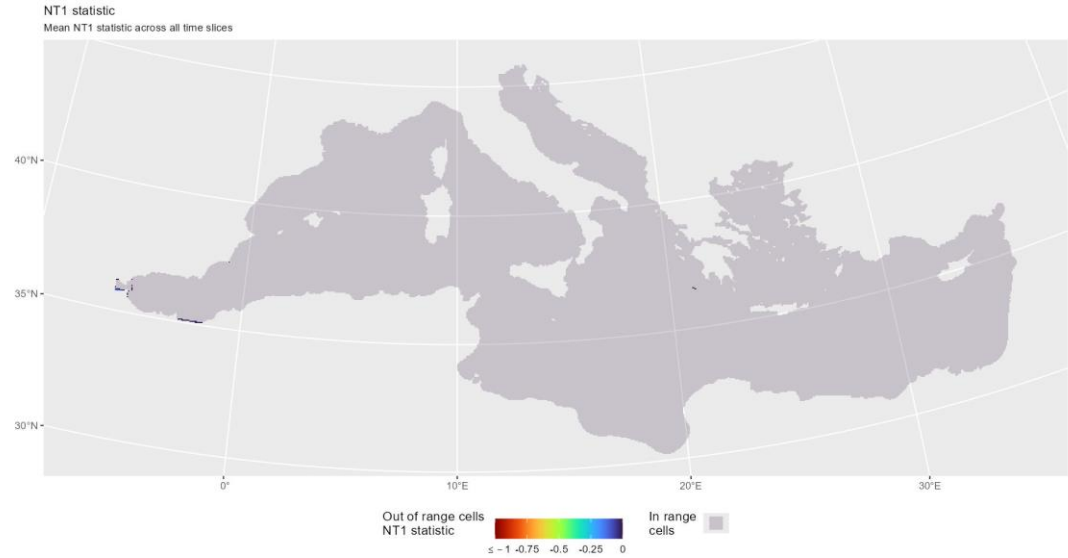

Figure H-31. NT1 statistics for long-finned pilot whale.

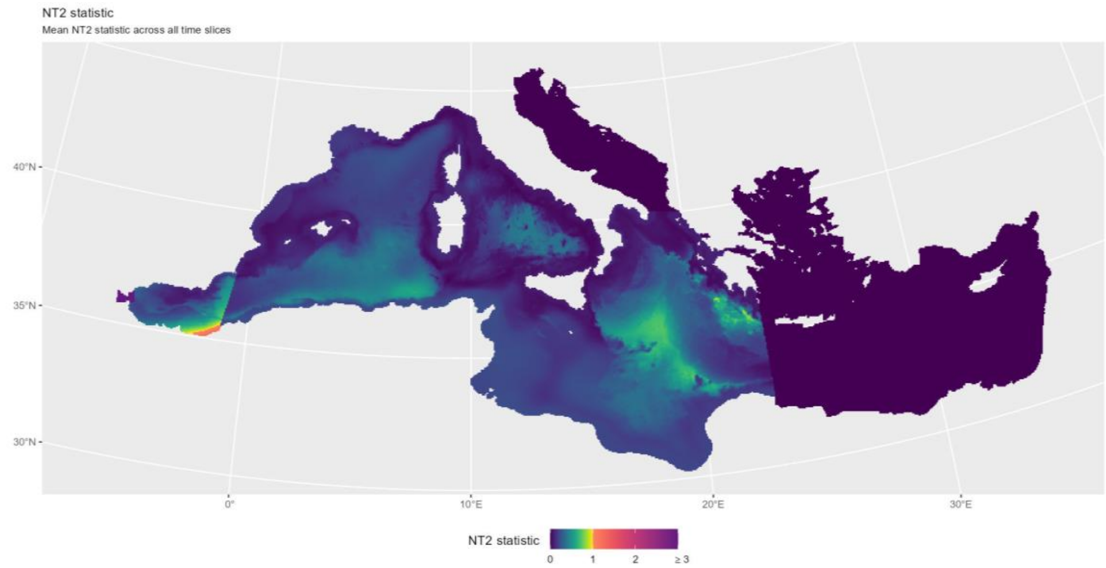

Figure H-32. NT2 statistics for long-finned pilot whale.

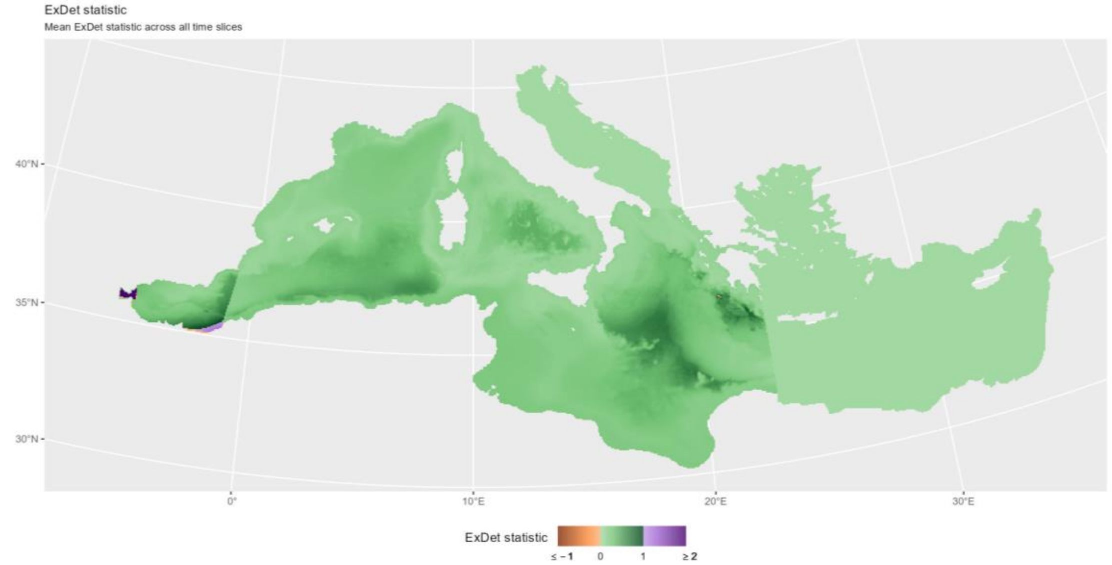

Figure H-33. ExDet statistics for long-finned pilot whale.

3.5. Cuvier's beaked whales

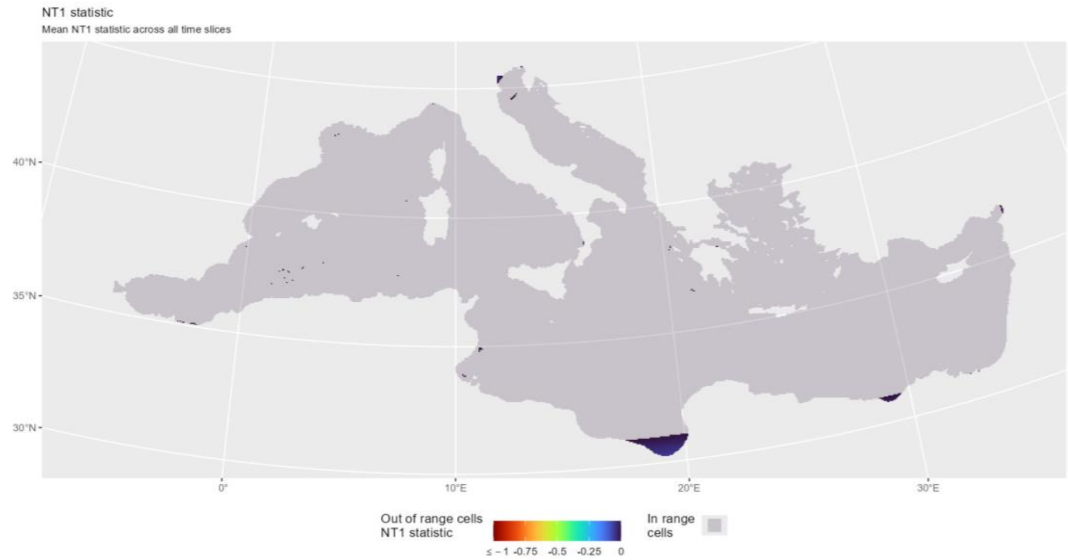

Figure H-34. NT1 statistics for Cuvier's beaked whales.

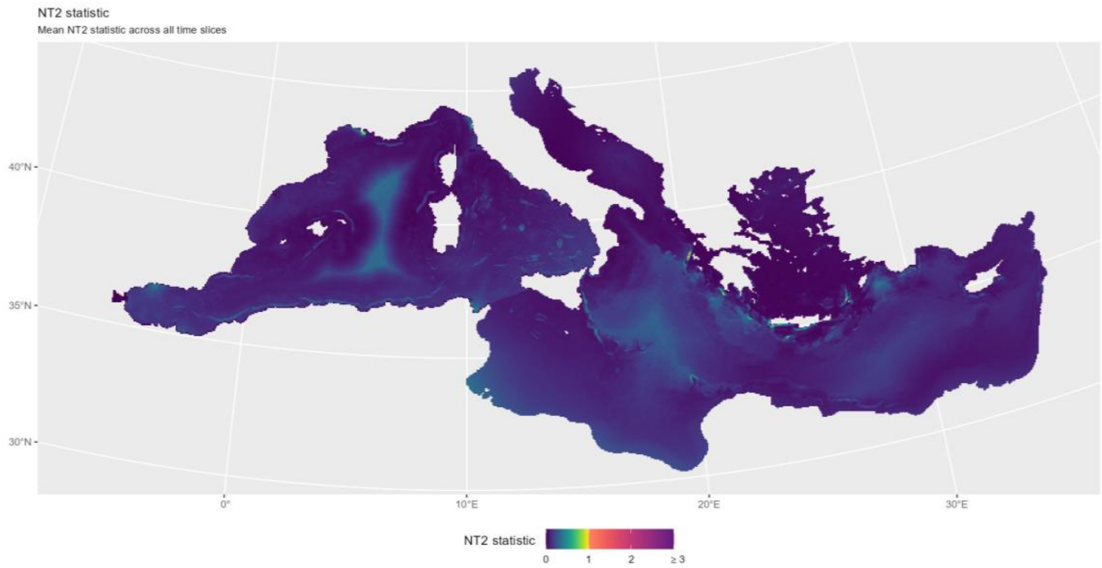

Figure H-35. NT2 statistics for Cuvier's beaked whales.

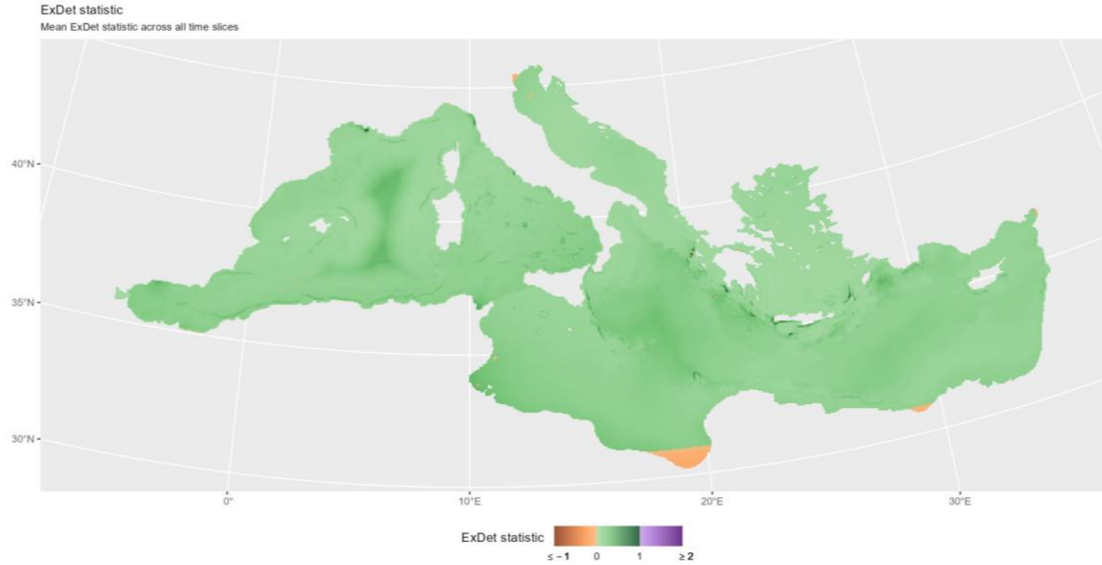

Figure H-36. ExDet statistics for Cuvier's beaked whales.

3.6. Bottlenose dolphin

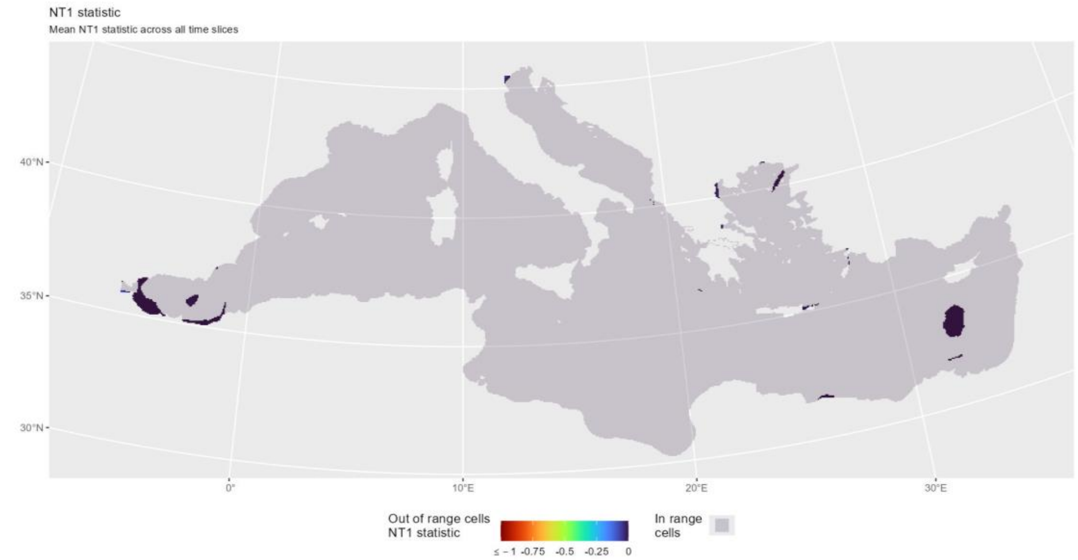

Figure H-37. NT1 statistics for bottlenose dolphin.

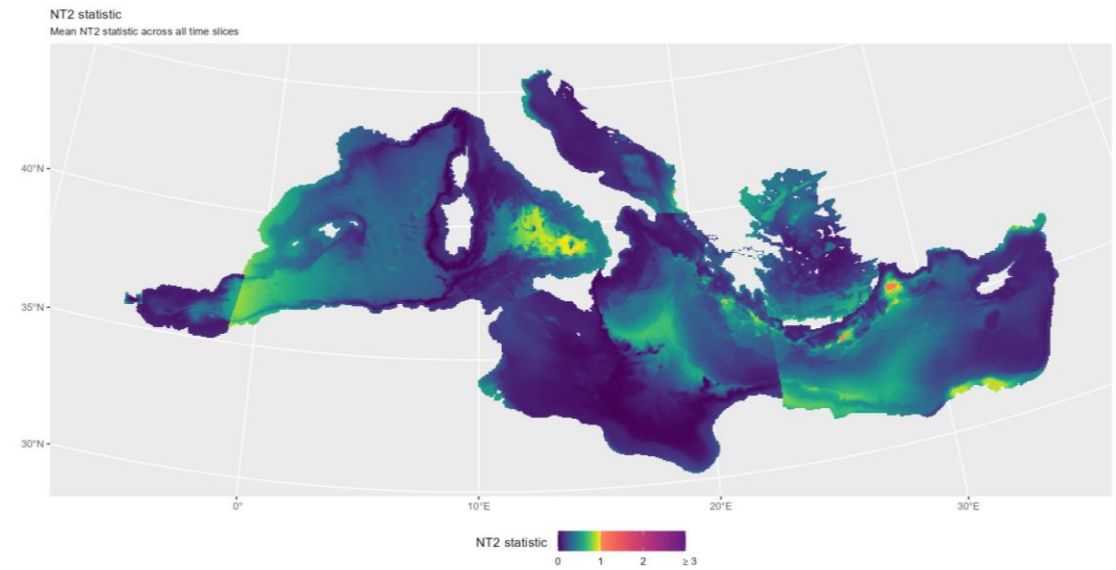

Figure H-38. NT2 statistics for bottlenose dolphin.

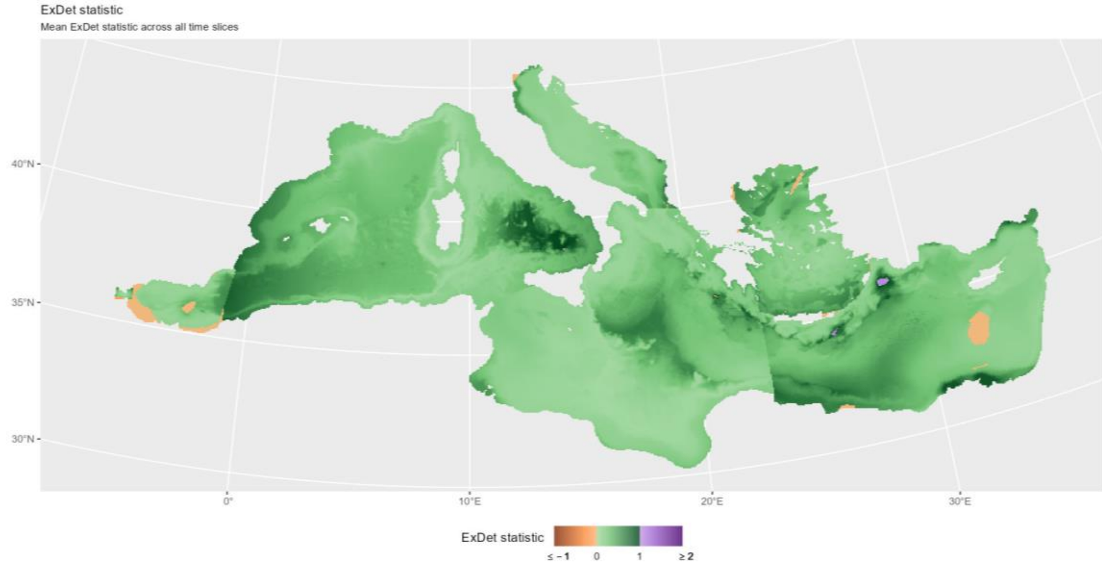

Figure H-39. ExDet statistics for bottlenose dolphin.

3.7. Common dolphin

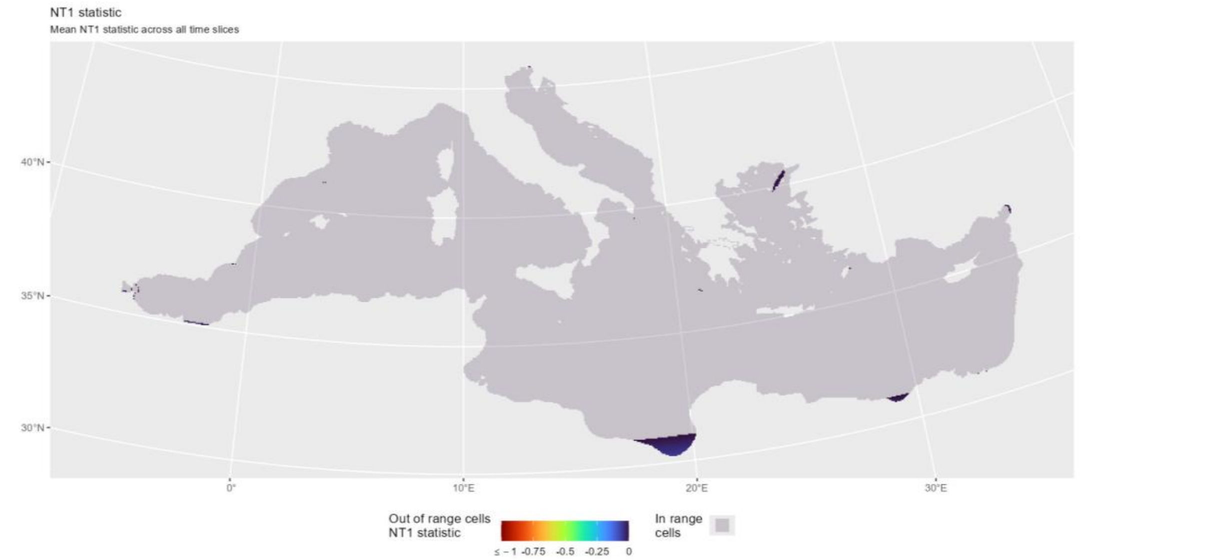

Figure H-40. NT1 statistics for common dolphin in summer.

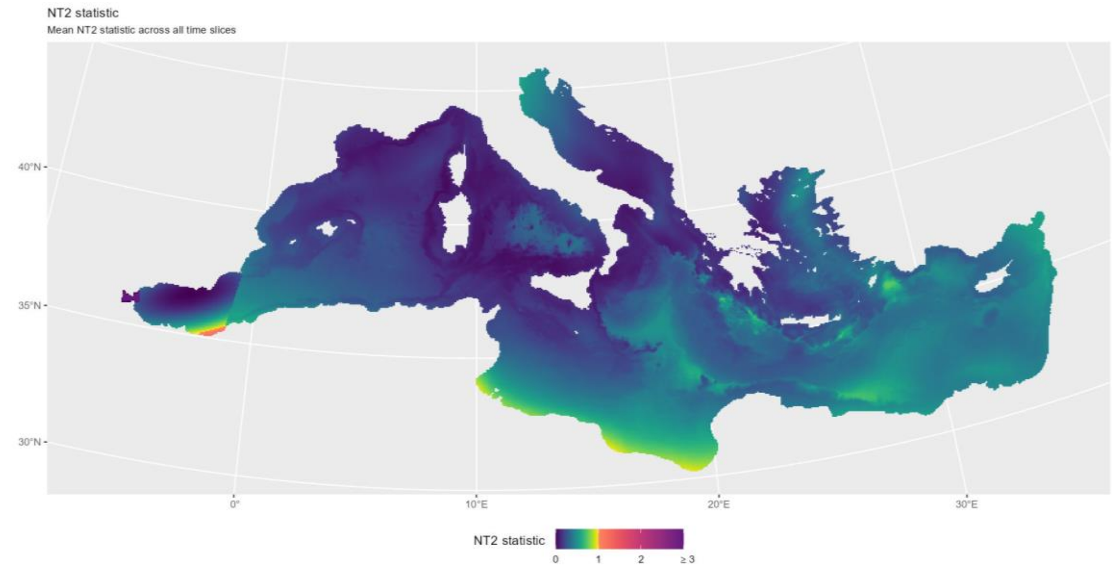

Figure H-41. NT2 statistics for common dolphin in summer.

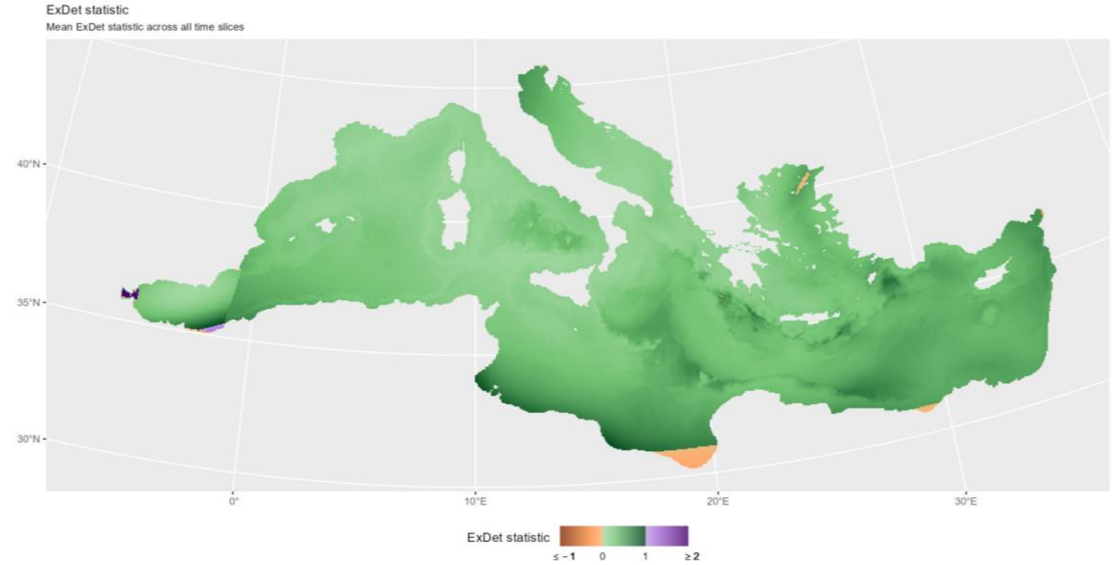

Figure H-42. ExDet statistics for common dolphin in summer.

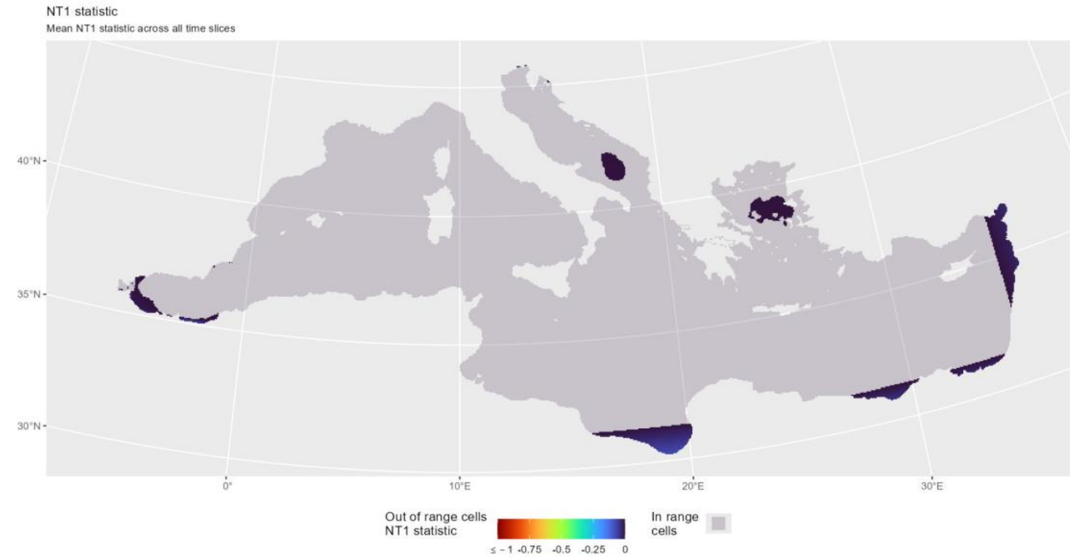

Figure H-43. NT1 statistics for common dolphin in winter.

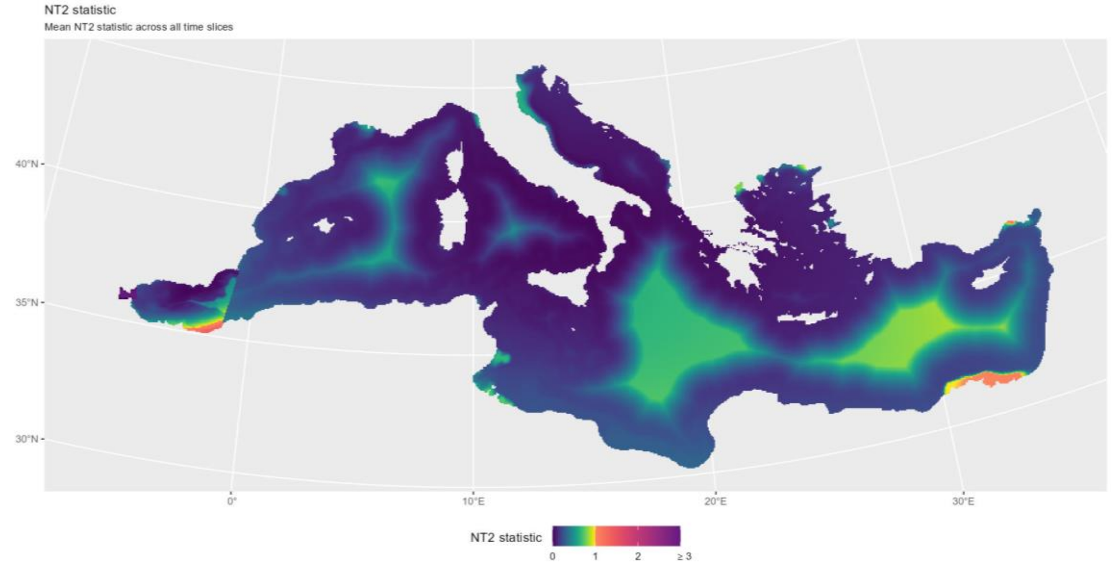

Figure H-44. NT2 statistics for common dolphin in winter.

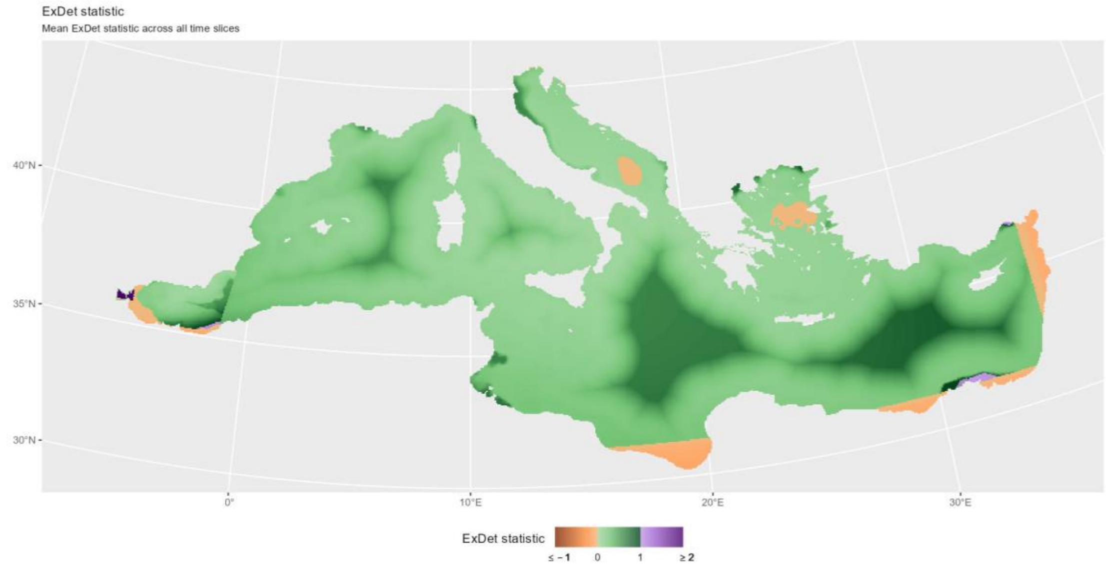

Figure H-45. ExDet statistics for common dolphin in winter.

3.8. Striped dolphin

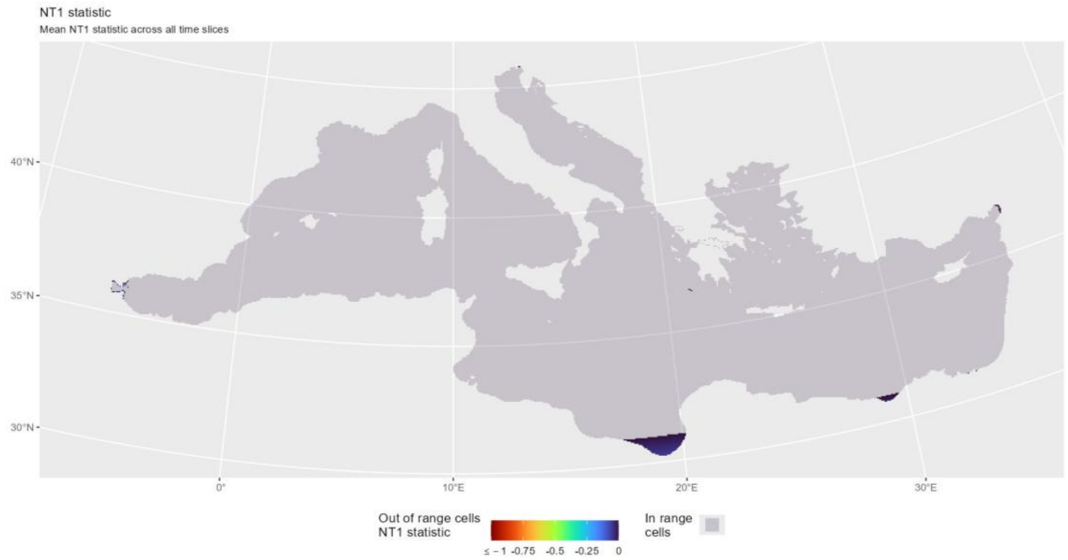

Figure H-46. NT1 statistics for striped dolphin in summer.

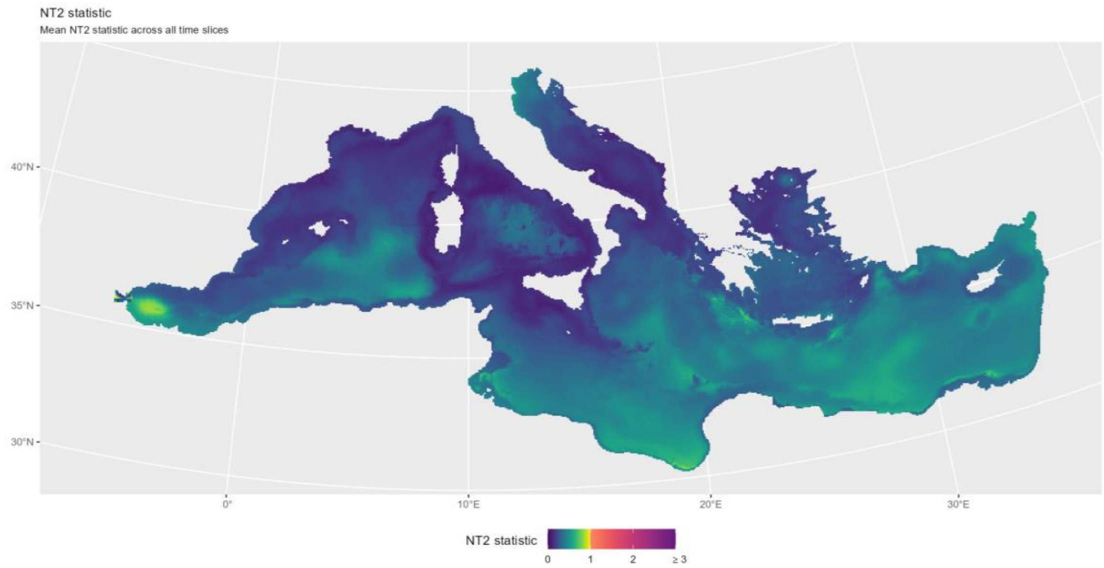

Figure H-47. NT2 statistics for striped dolphin in summer.

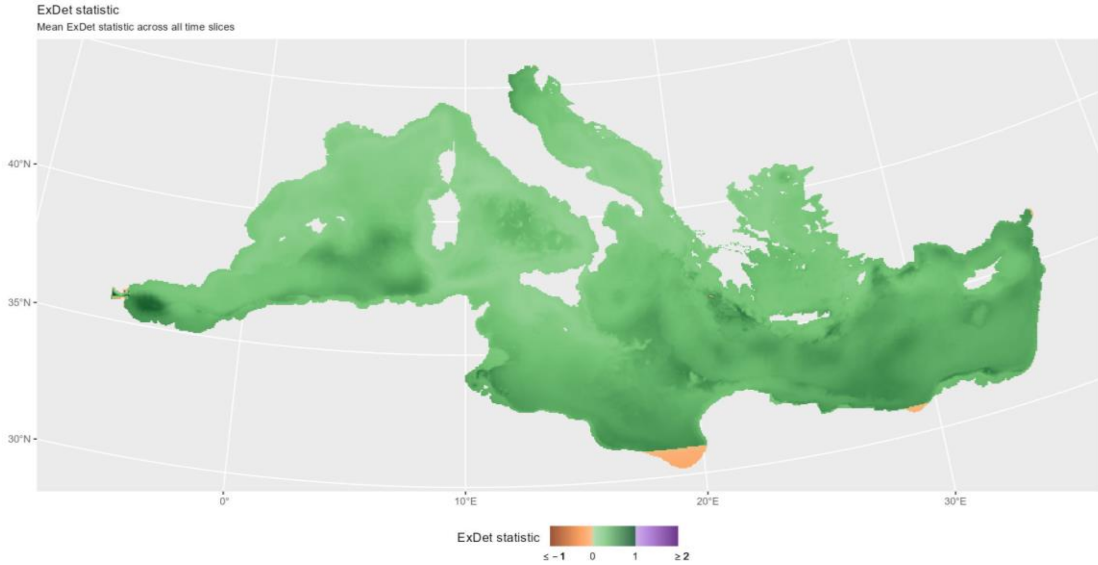

Figure H-48. ExDet statistics for striped dolphin in summer.

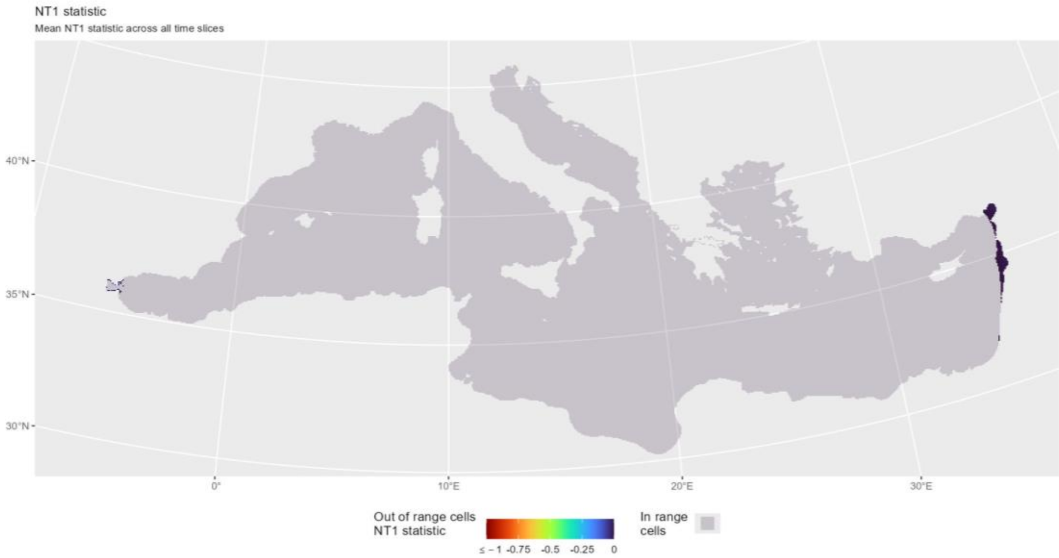

Figure H-49. NT1 statistics for striped dolphin in winter.

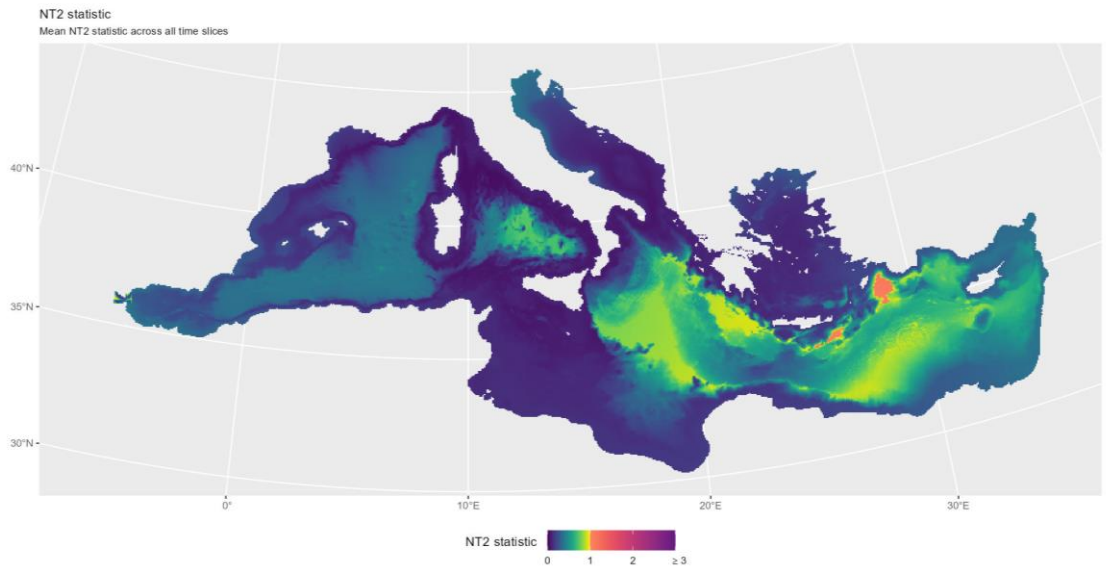

Figure H-50. NT2 statistics for striped dolphin in winter.

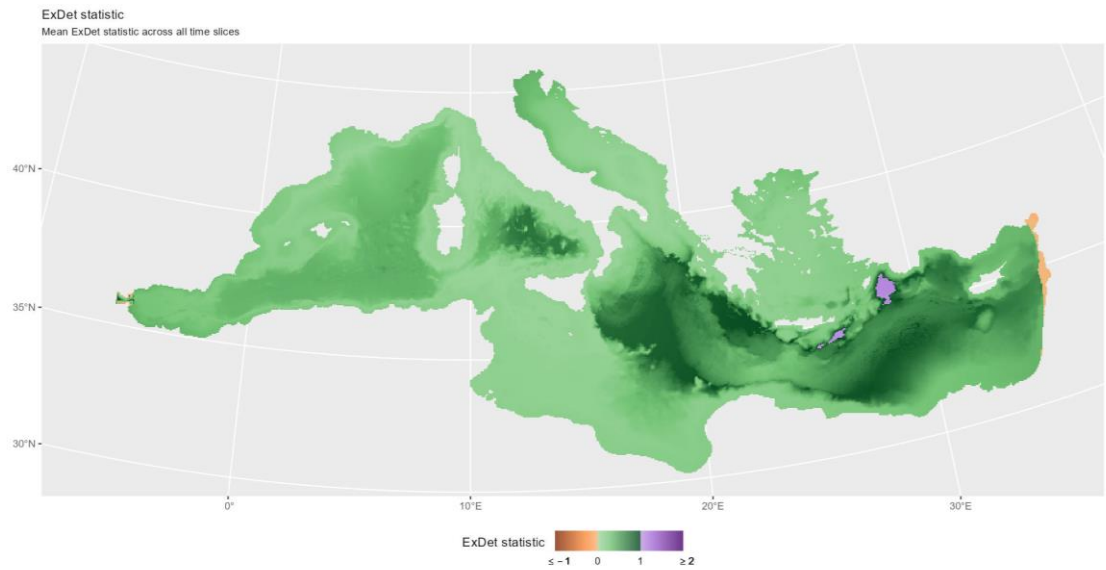

Figure H-51. ExDet statistics for striped dolphin in winter.

3.9. Harbor porpoise

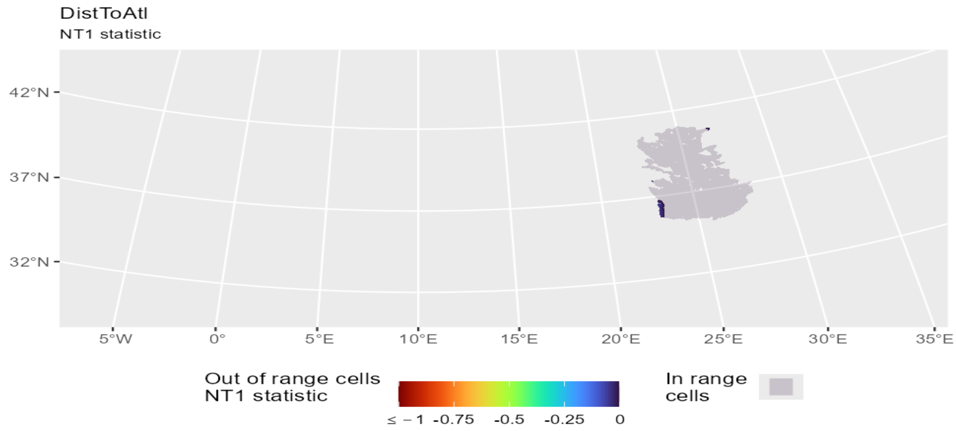

Figure H-52. NT1 statistics for harbor porpoise in summer.

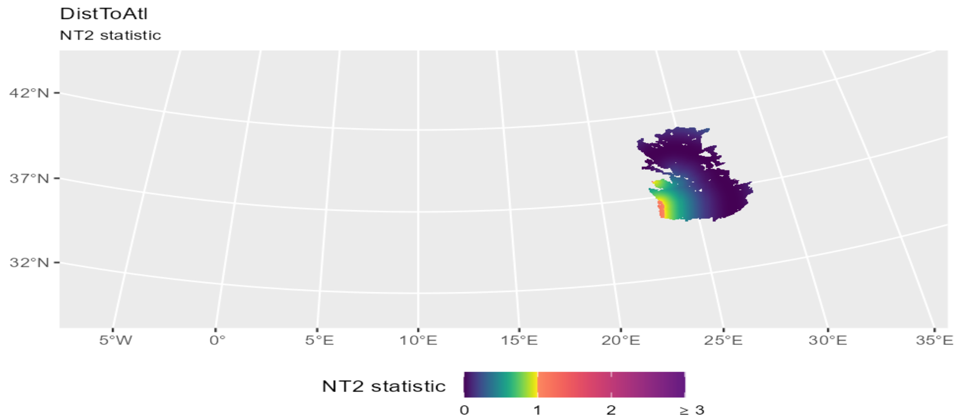

Figure H-53. NT2 statistics for harbor porpoise in summer.

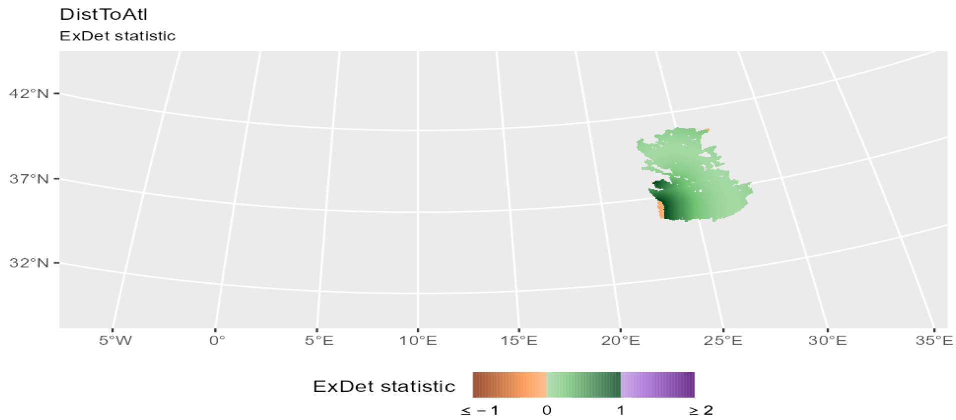

Figure H-54. ExDet statistics for harbor porpoise in summer.

3.10. Killer whale

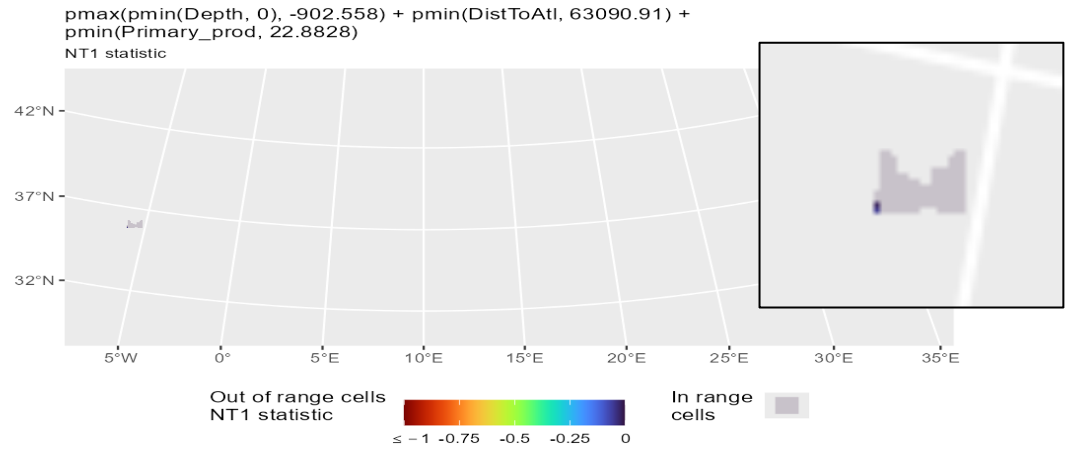

Figure H-55. NT1 statistics for killer whale.

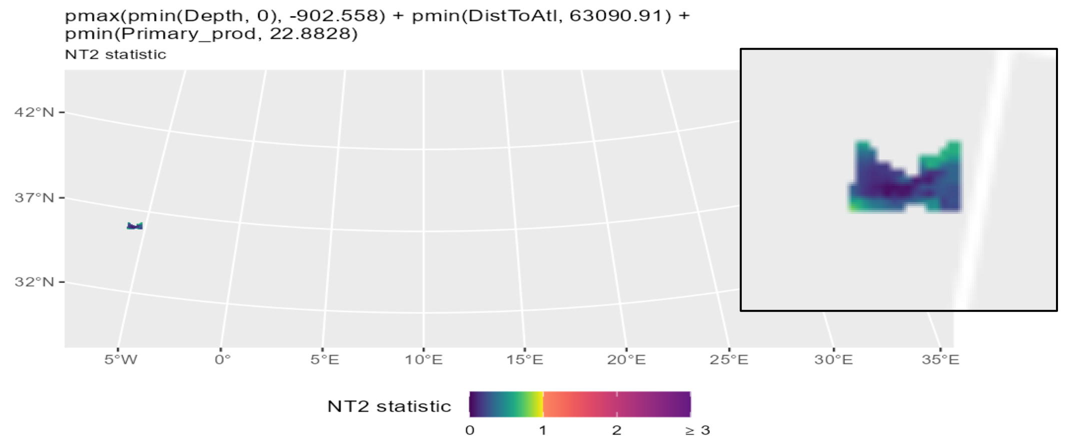

Figure H-56. NT2 statistics for killer whale.

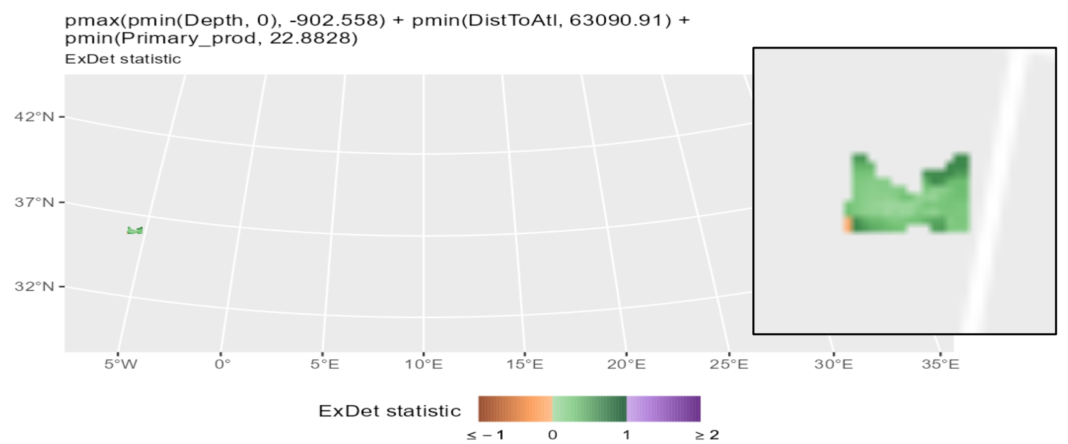

Figure H-57. ExDet statistics for killer whale.

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I

Plots of covariates

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Appendix I: Plots of covariates

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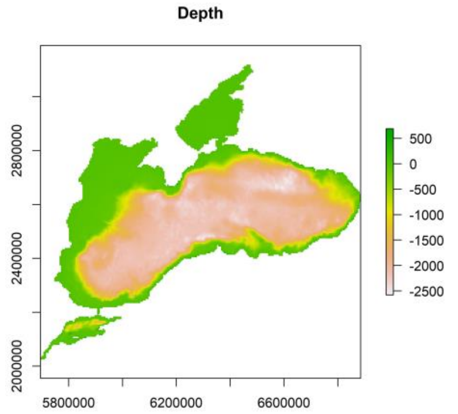
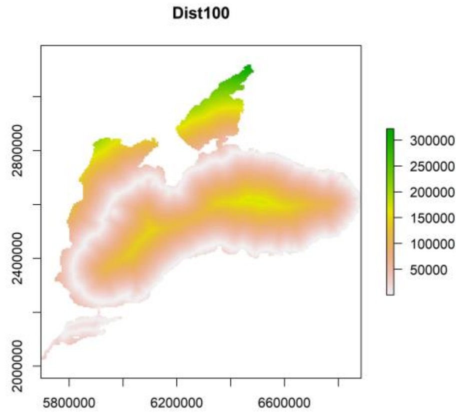
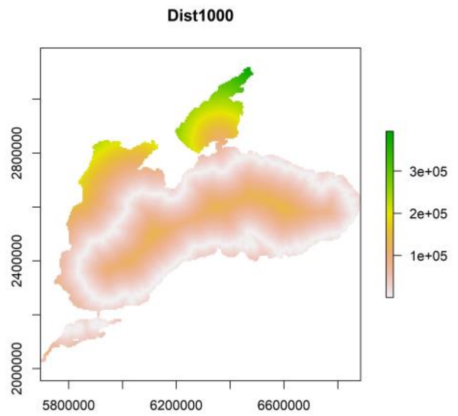
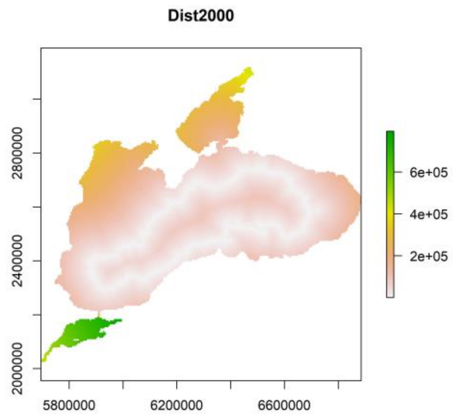
1. Plots of static covariates

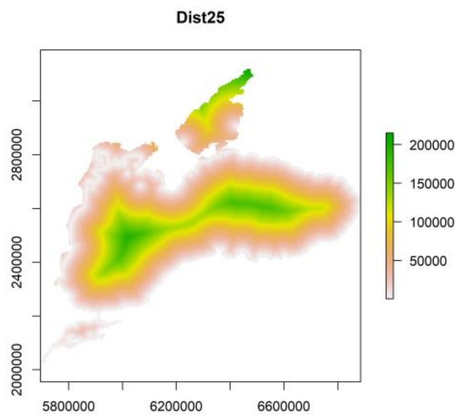
1.1. Static covariates for the Black Sea

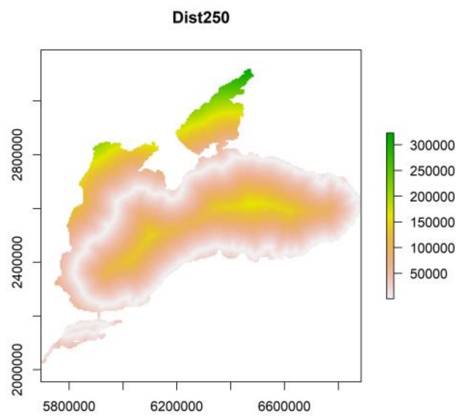


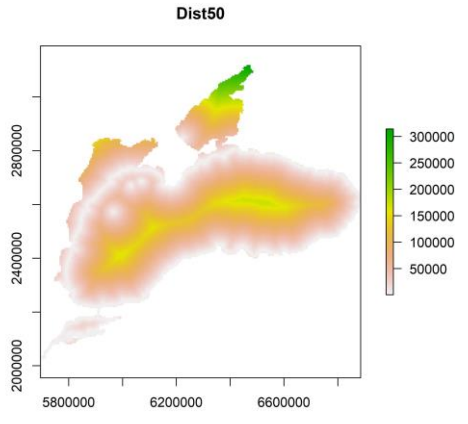








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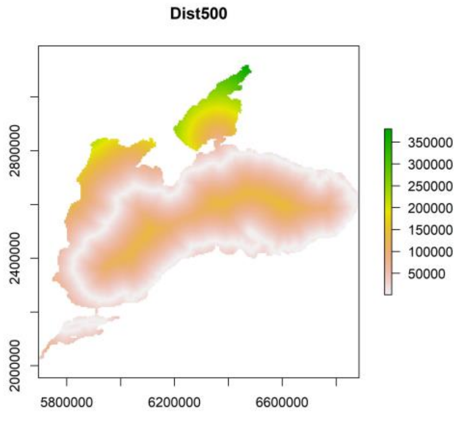
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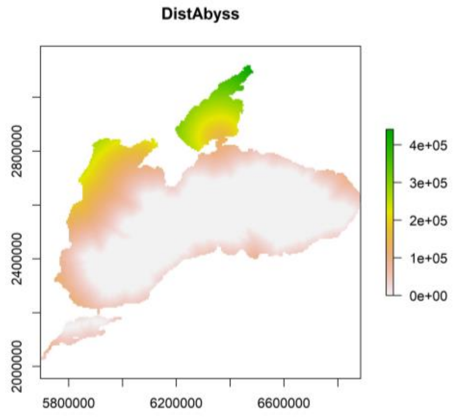
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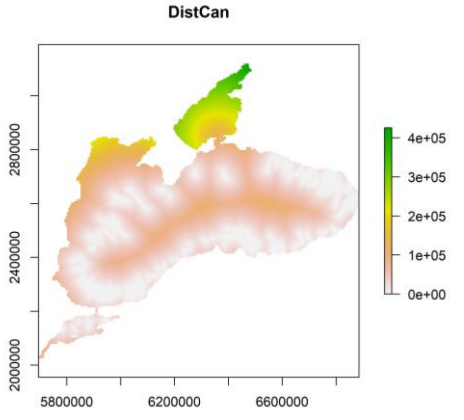
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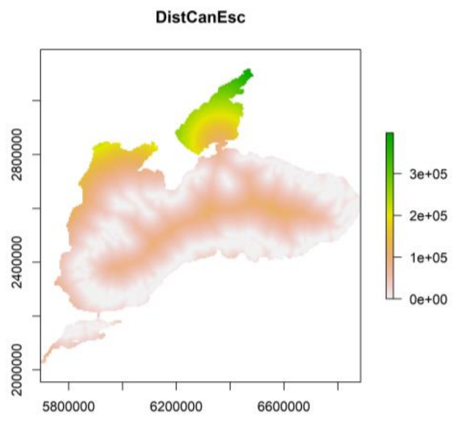
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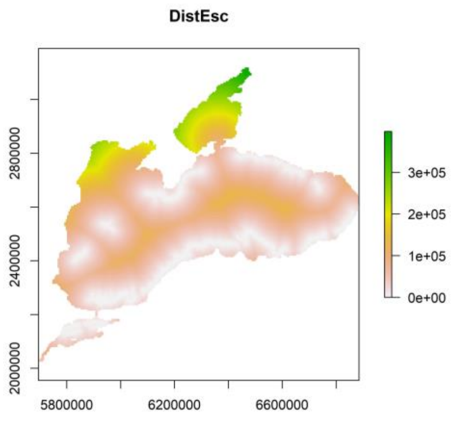
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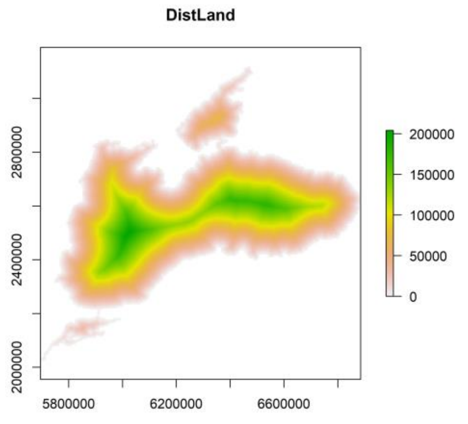
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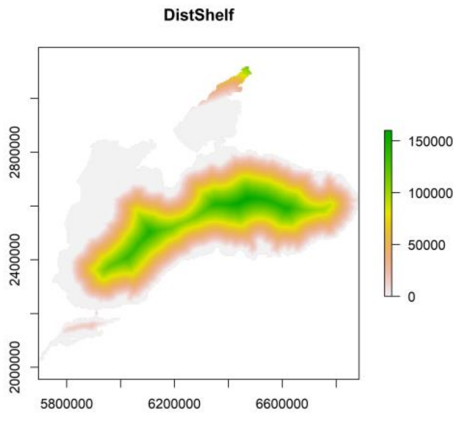
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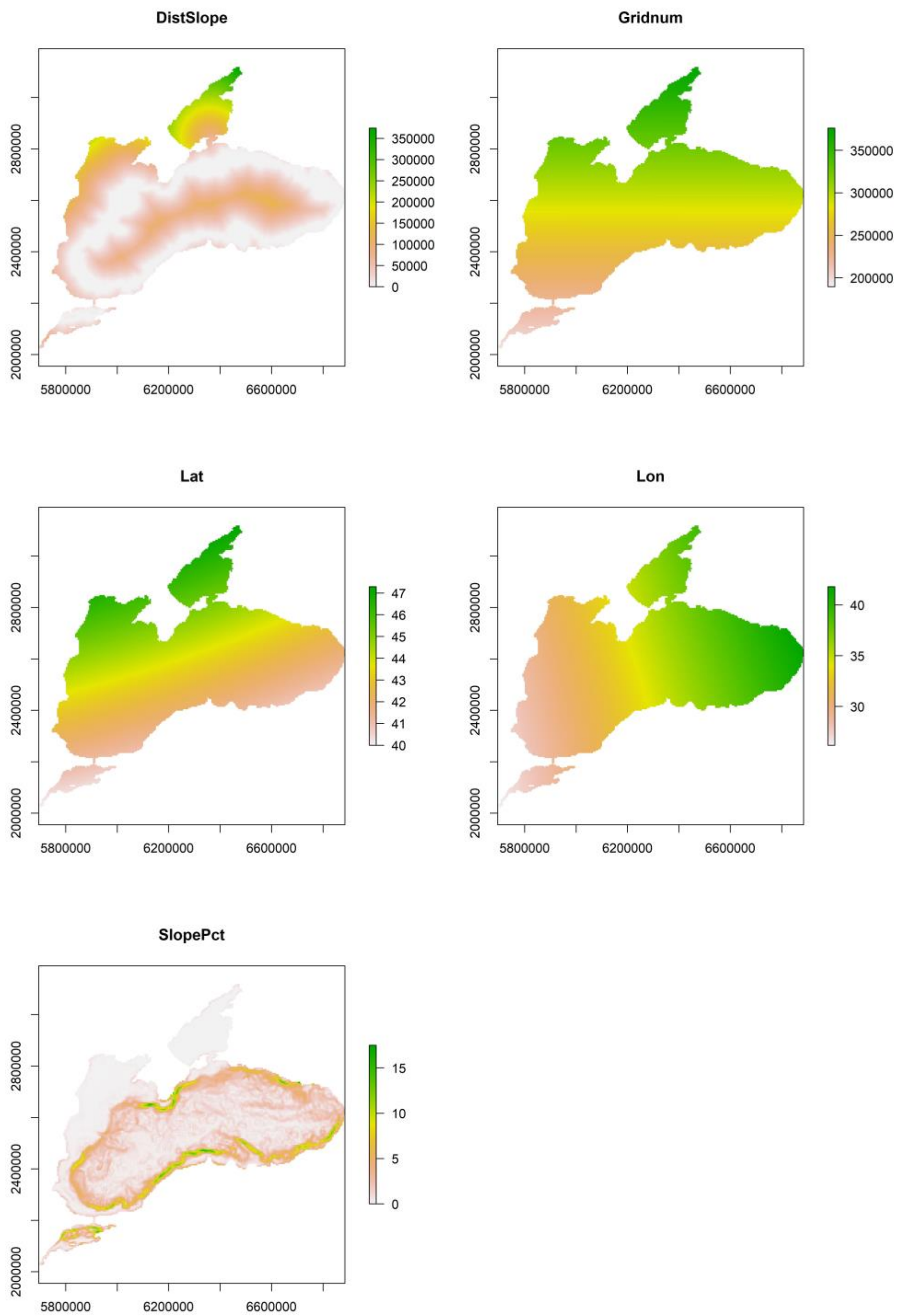
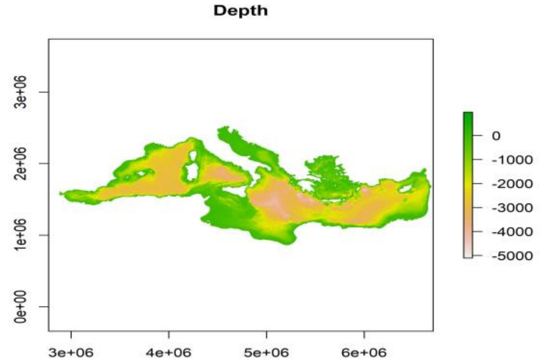
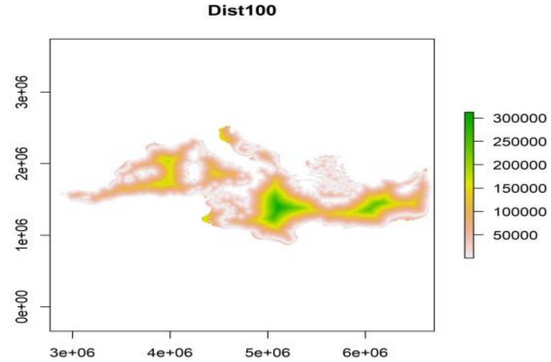
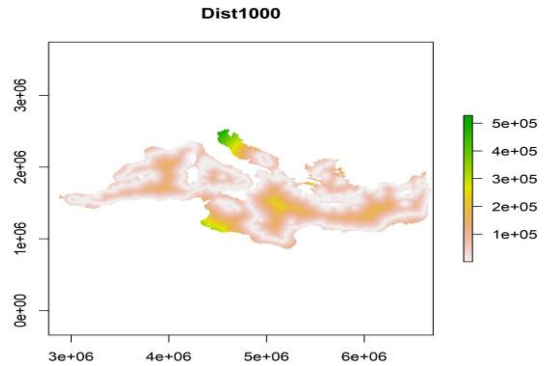


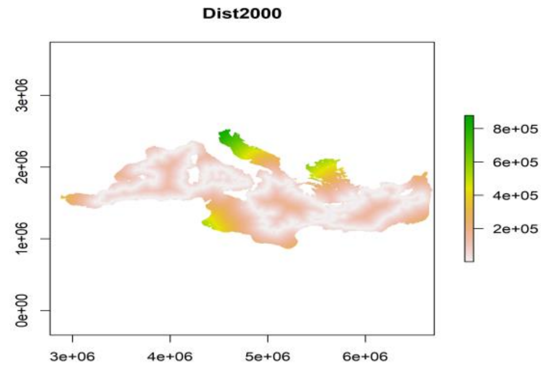
Figure I-1. Plots of static covariates for the Black Sea.

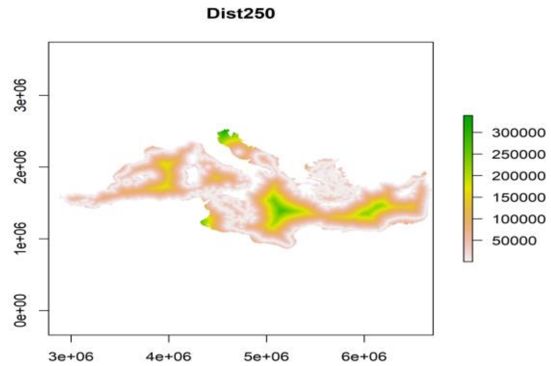
1.2. Static covariates for the Mediterranean Sea

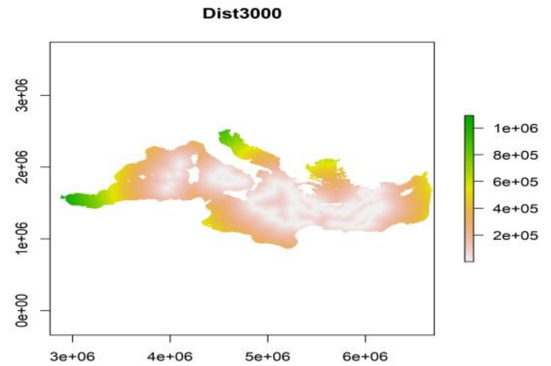


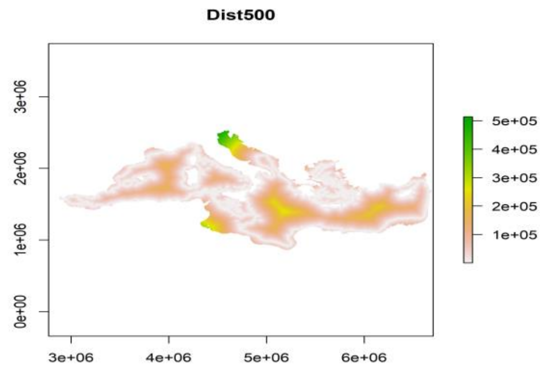


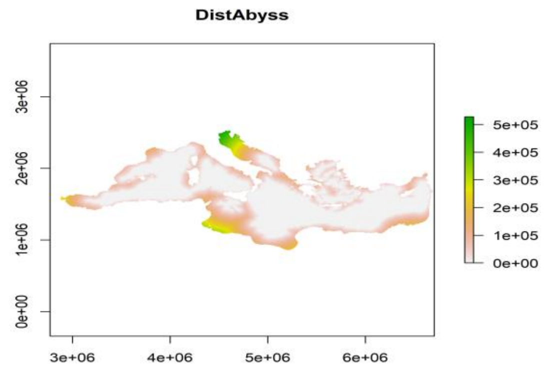


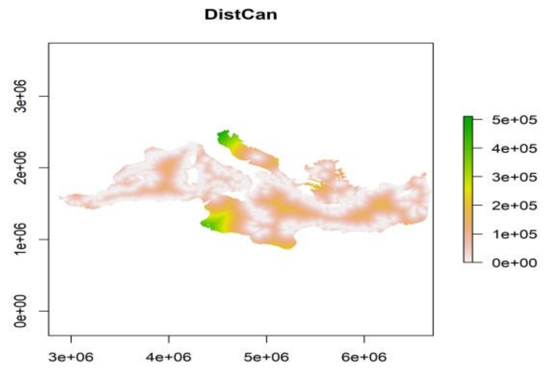








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1e+06
0e+00
3e+06 4e+06 5e+06 6e+06
5e+05
4e+05
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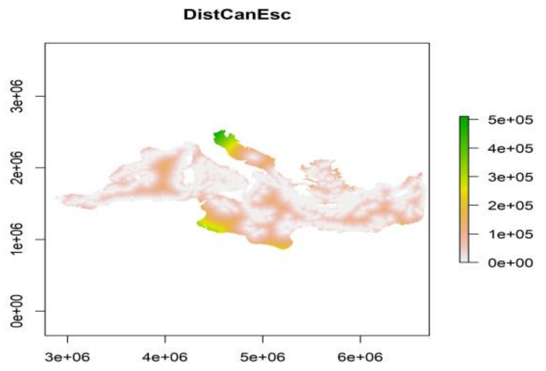
1e+05
0e+00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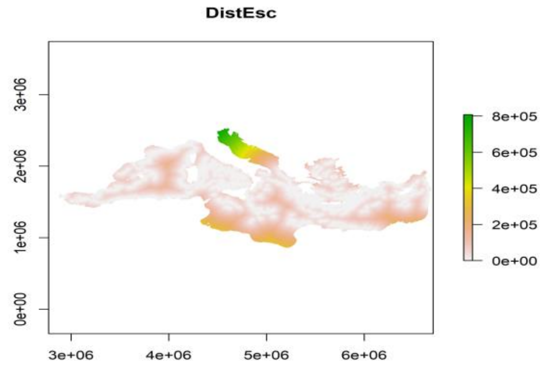
1e+05
0e+00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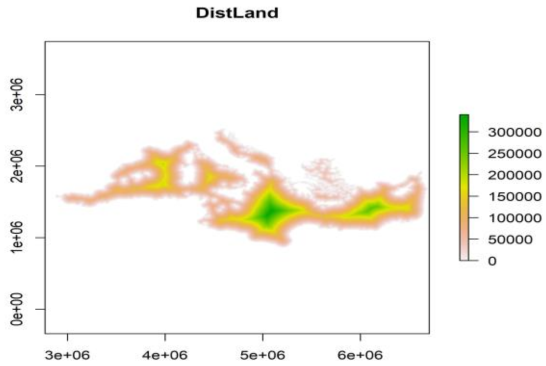
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3e+06 4e+06 5e+06 6e+06
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150000
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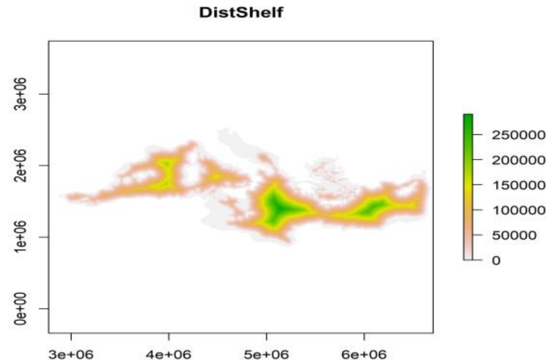
50000
0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50000
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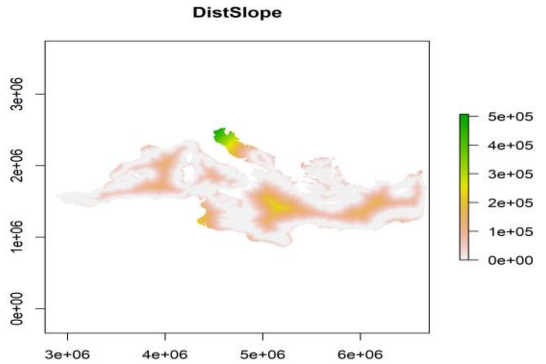
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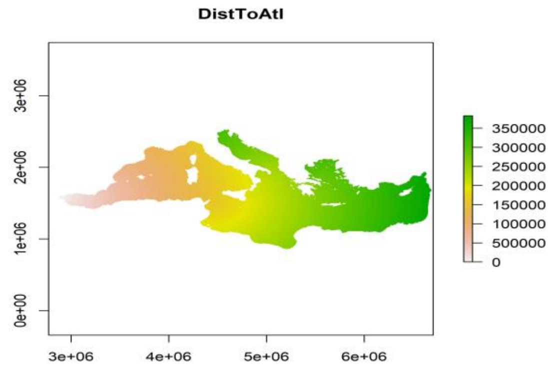
1e+05
0e+00


DistToAtl
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500000
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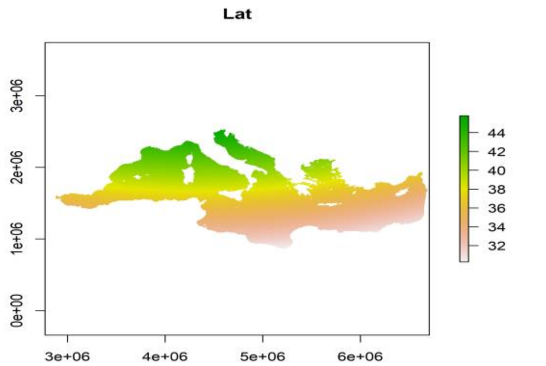
Lat
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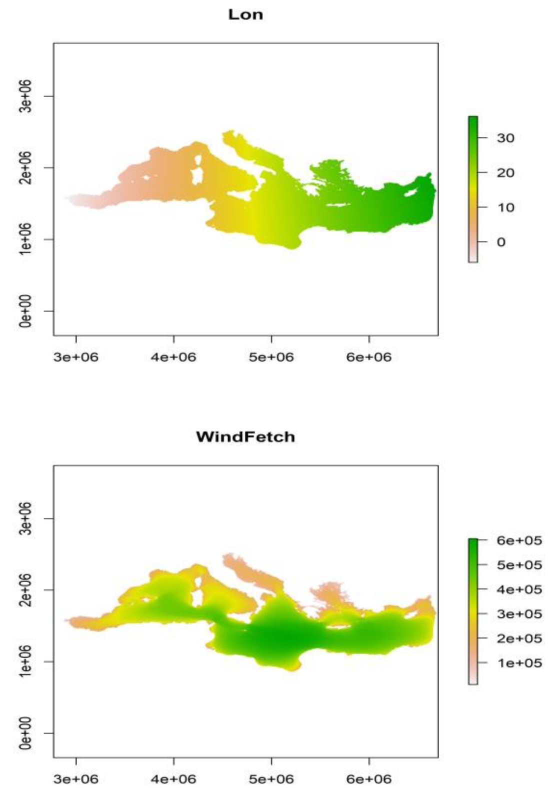

Figure I-2. Plots of static covariates for the Mediterranean Sea.

2. Plots of dynamic covariates

2.1. Climatologies of dynamic covariates for the Black Sea

2.1.1. Climatologies of chlorophyll

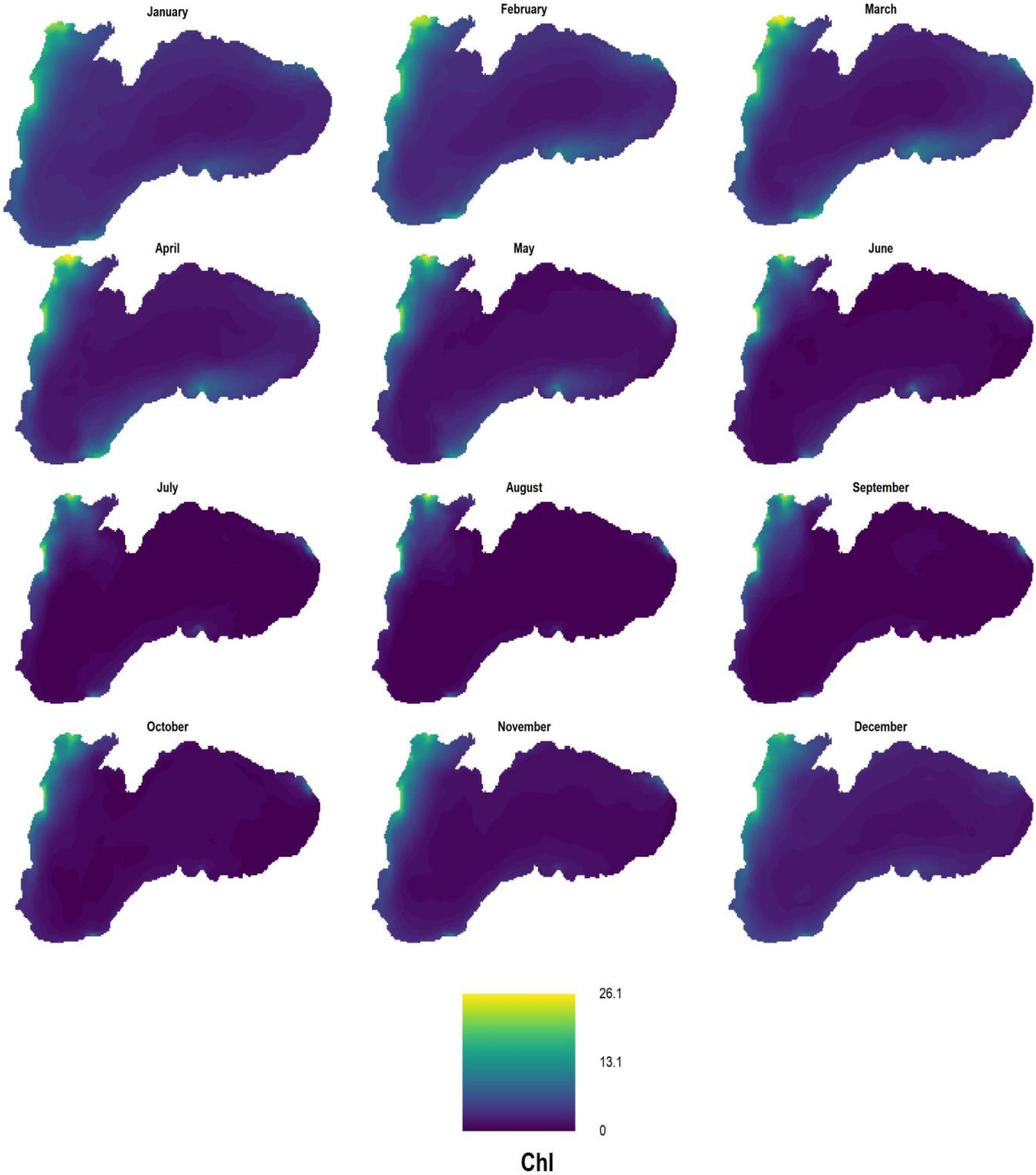

Figure I-3. Plots of monthly climatologies of chlorophyll for the Black Sea.

2.1.2. Climatologies of eastwards current velocity

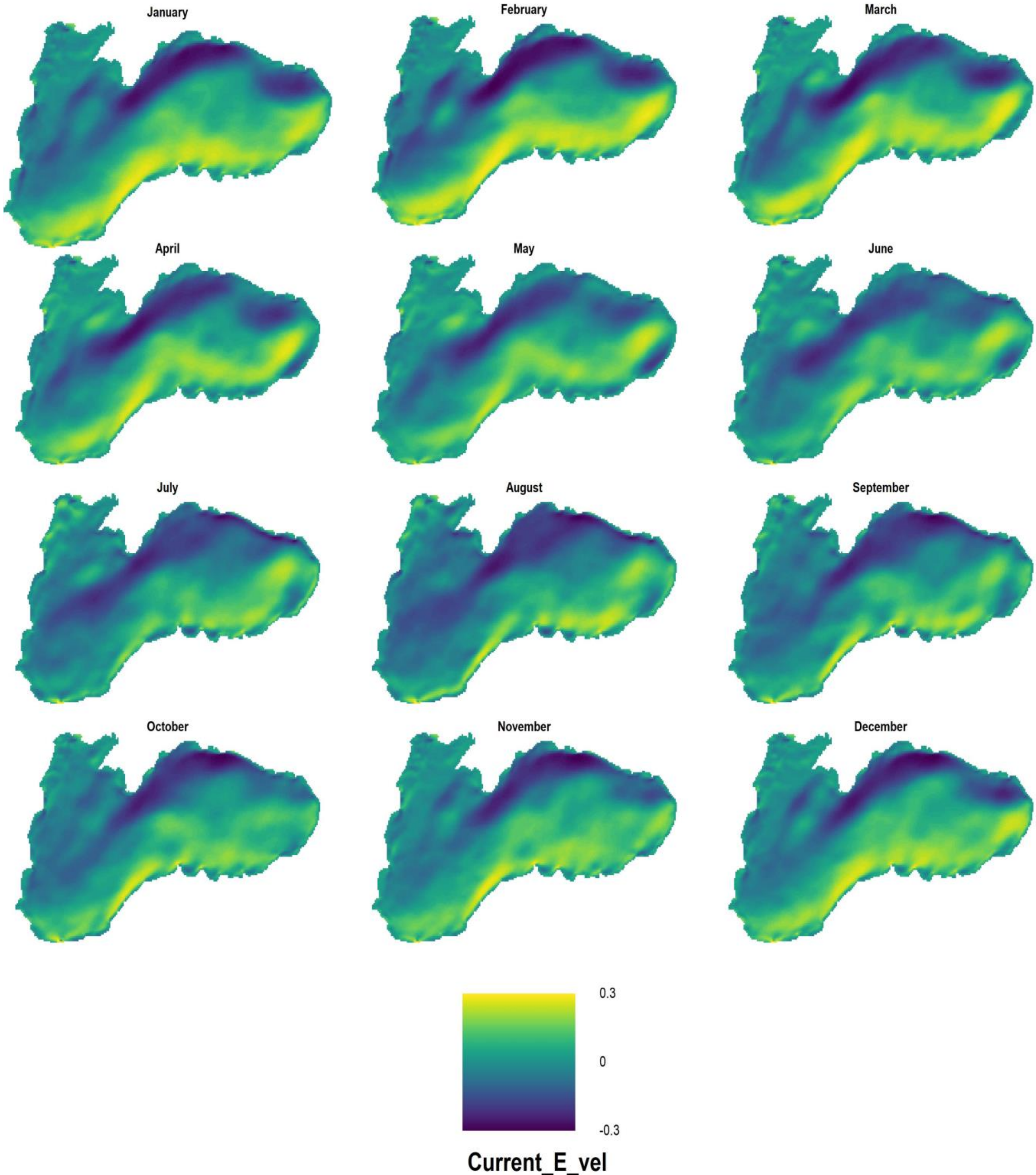

Figure I-4. Plots of monthly climatologies of eastwards current velocity for the Black Sea.

2.1.3. Climatologies of northwards current velocity

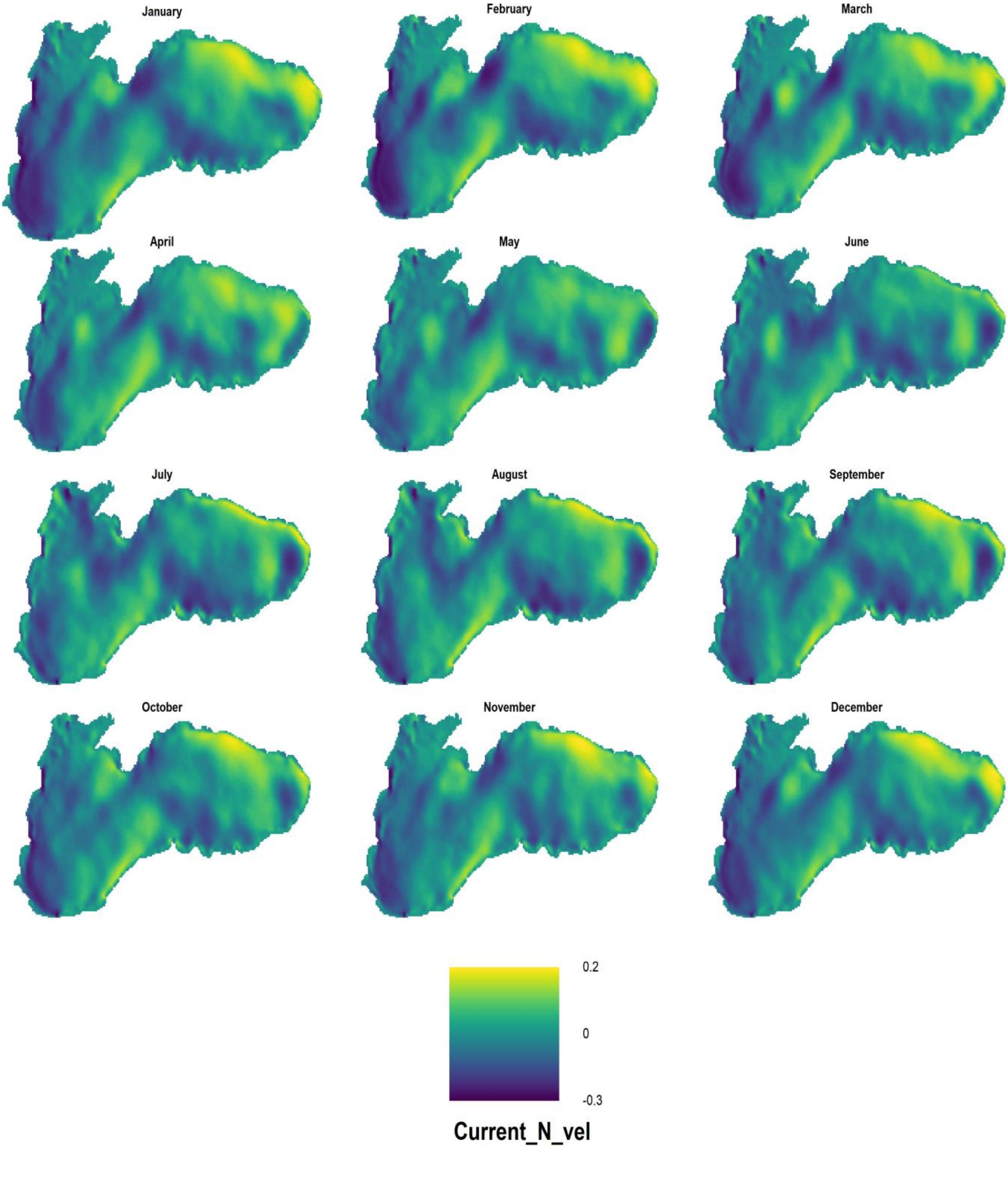

Figure I-5. Plots of monthly climatologies of northwards current velocity for the Black Sea.

2.1.4. Climatologies of mixedlayerthickness

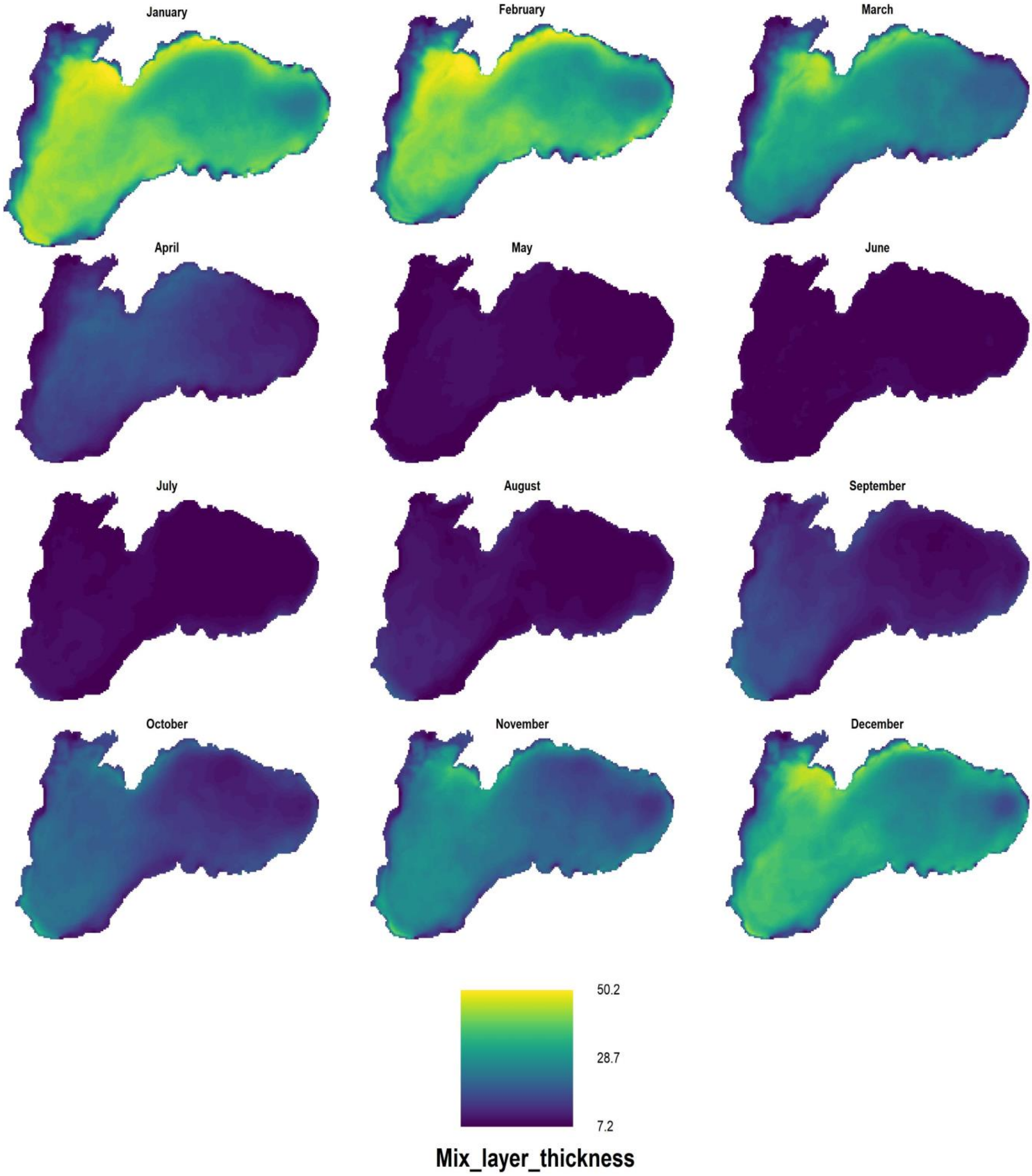

Figure I-6. Plots of monthly climatologies of mixedlayerthickness for the Black Sea.

2.1.5. Climatologies of phytoplankton

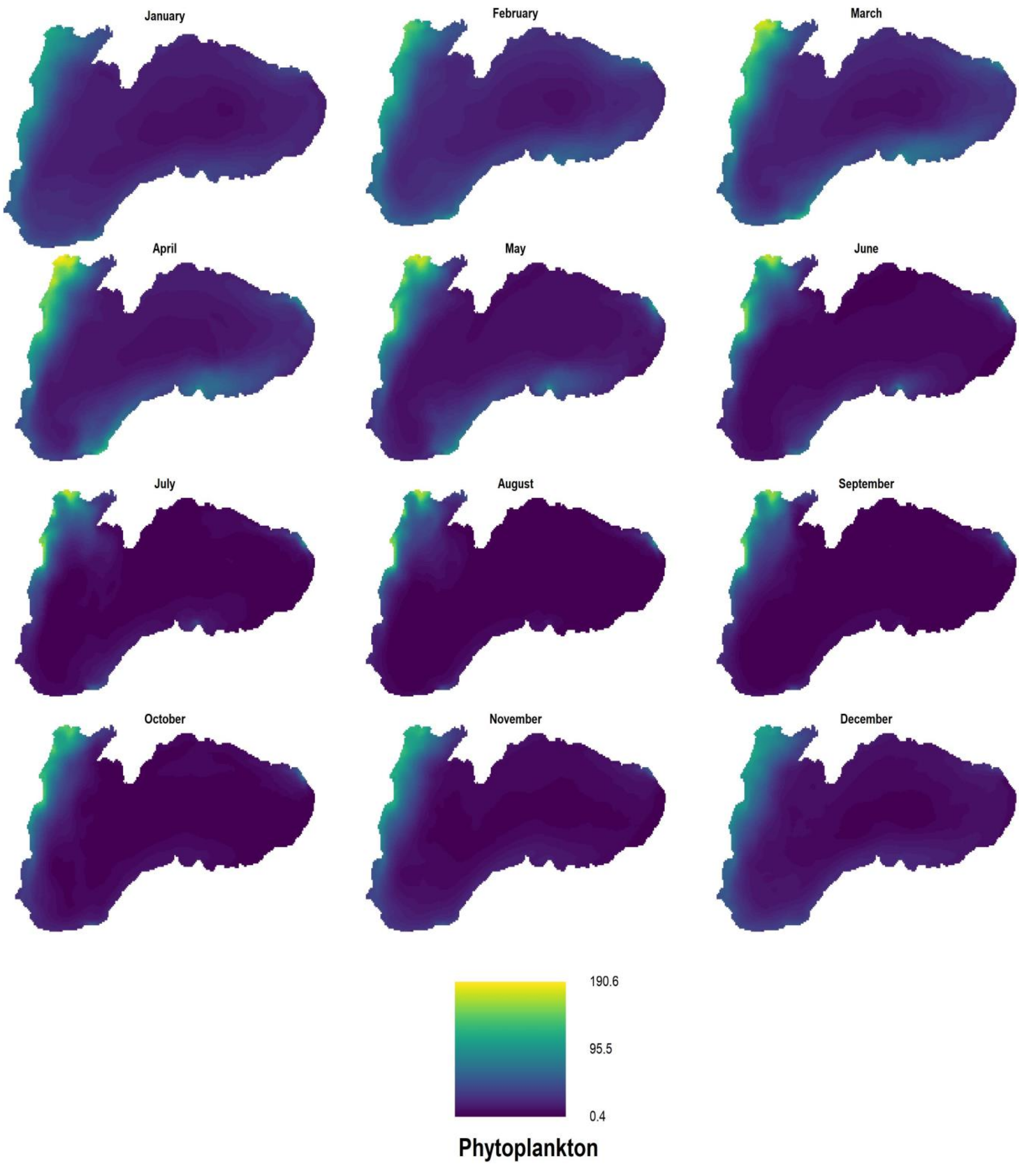

Figure I-7. Plots of monthly climatologies of phytoplankton for the Black Sea.

2.1.6. Climatologies of primaryproductivity

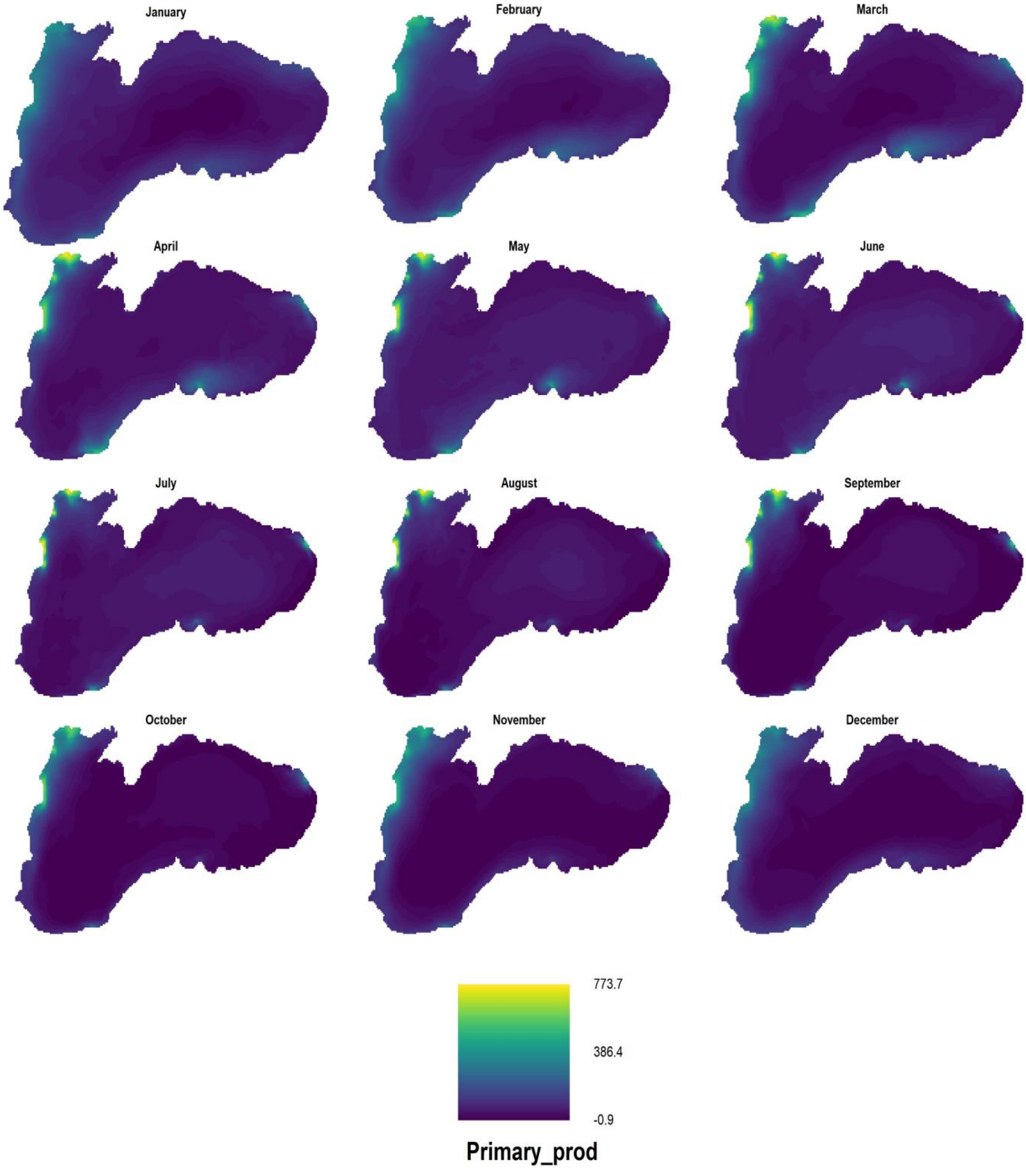

Figure I-8. Plots of monthly climatologies of primaryproductivity for the Black Sea.

2.1.7. Climatologies of salinity

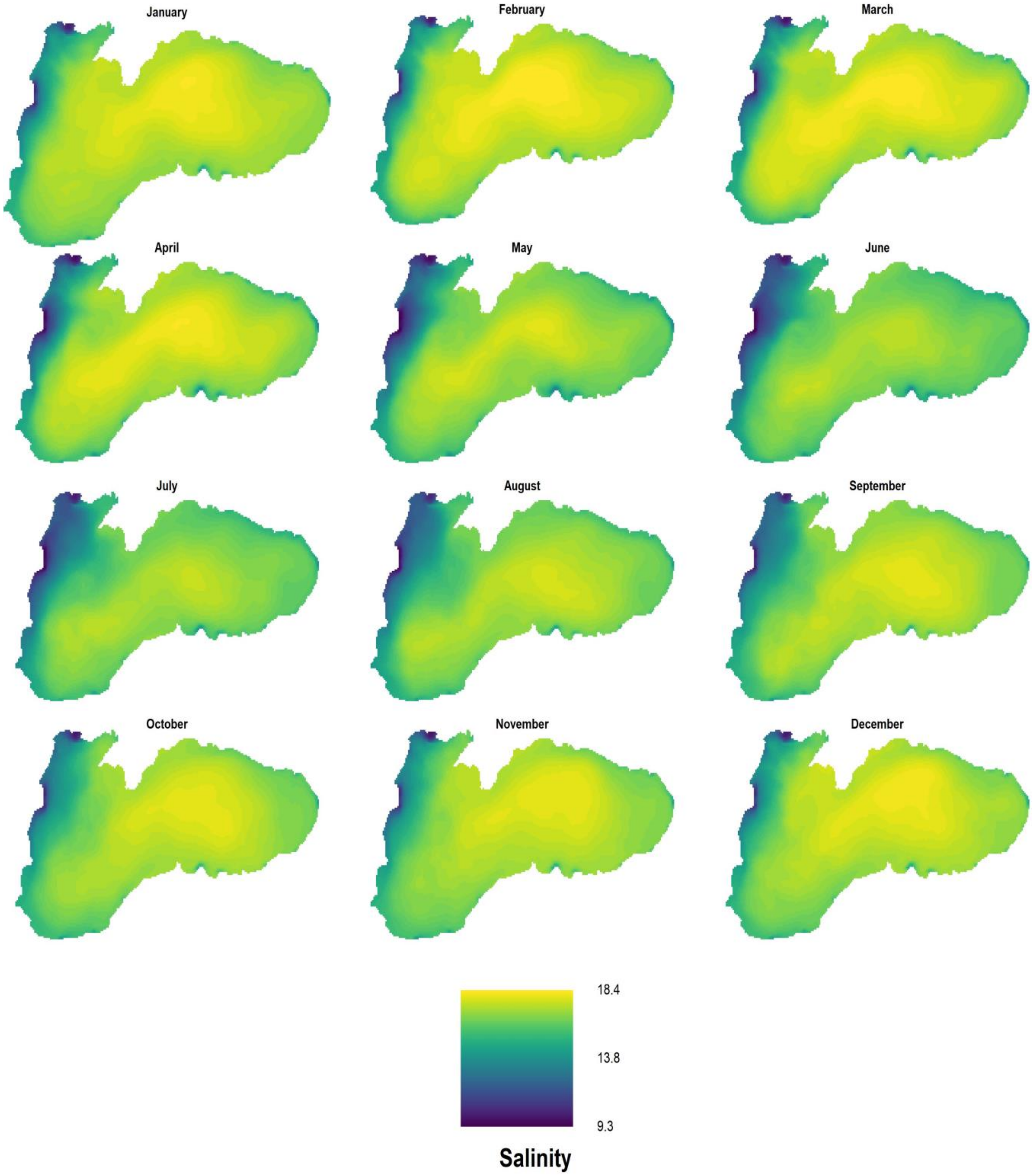

Figure I-9. Plots of monthly climatologies of salinity for the Black Sea.

2.1.8. Climatologies of sea bottom temperature

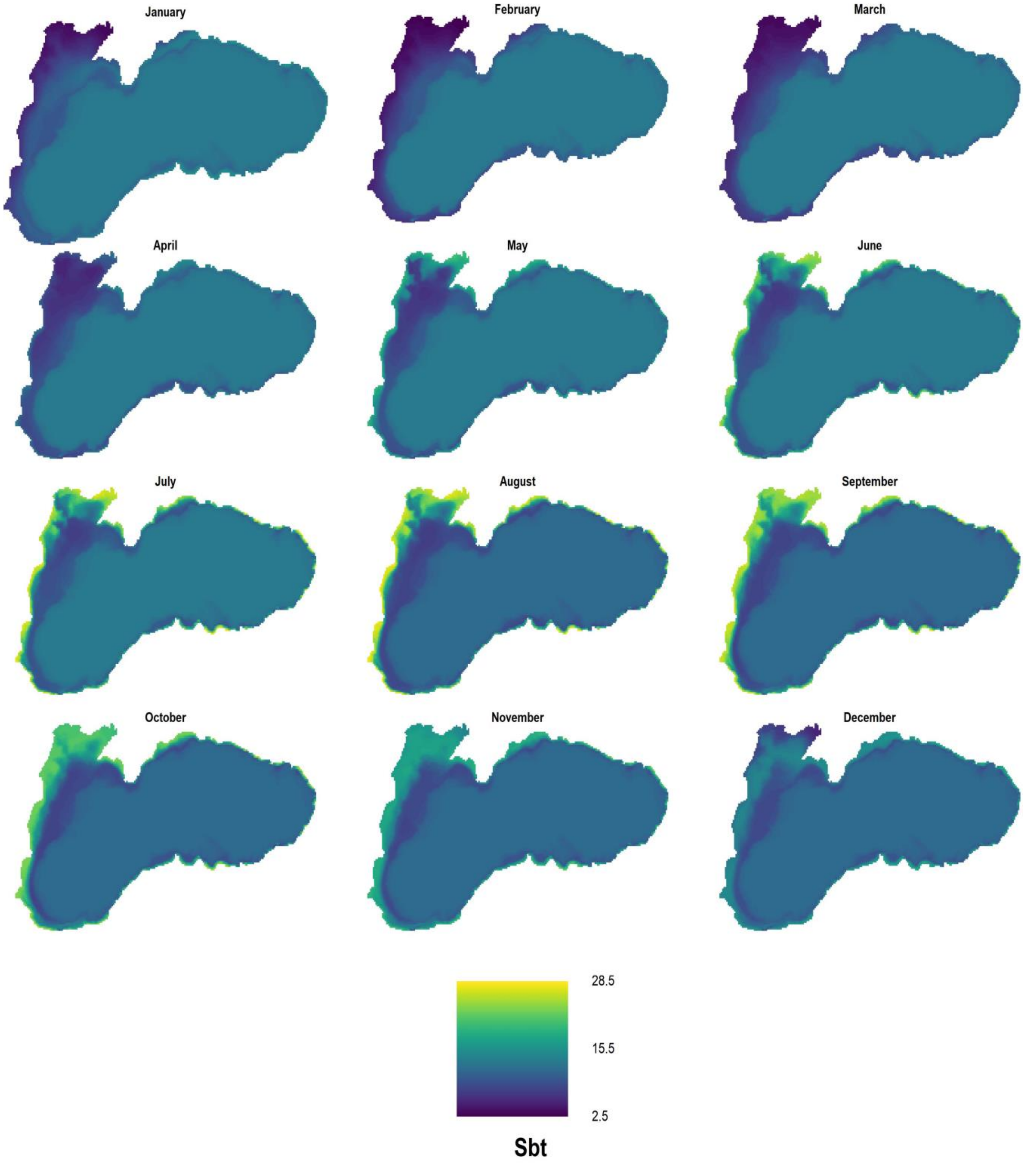

Figure I-10. Plots of monthly climatologies of sea bottom temperature for the Black Sea.

2.1.9. Climatologies of sea surface height

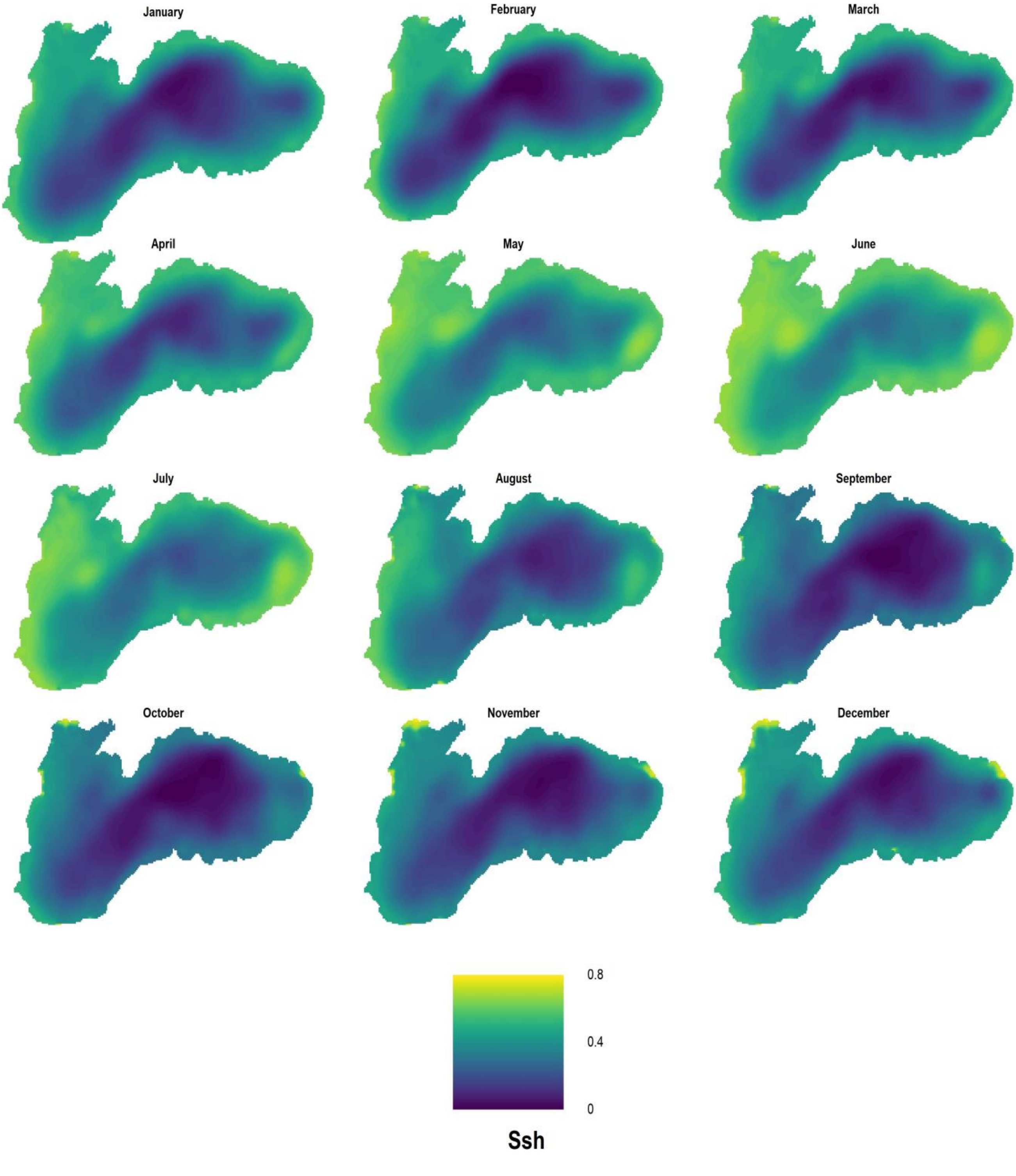

Figure I-11. Plots of monthly climatologies of sea surface height for the Black Sea.

2.1.10. Climatologies of sea surface temperature

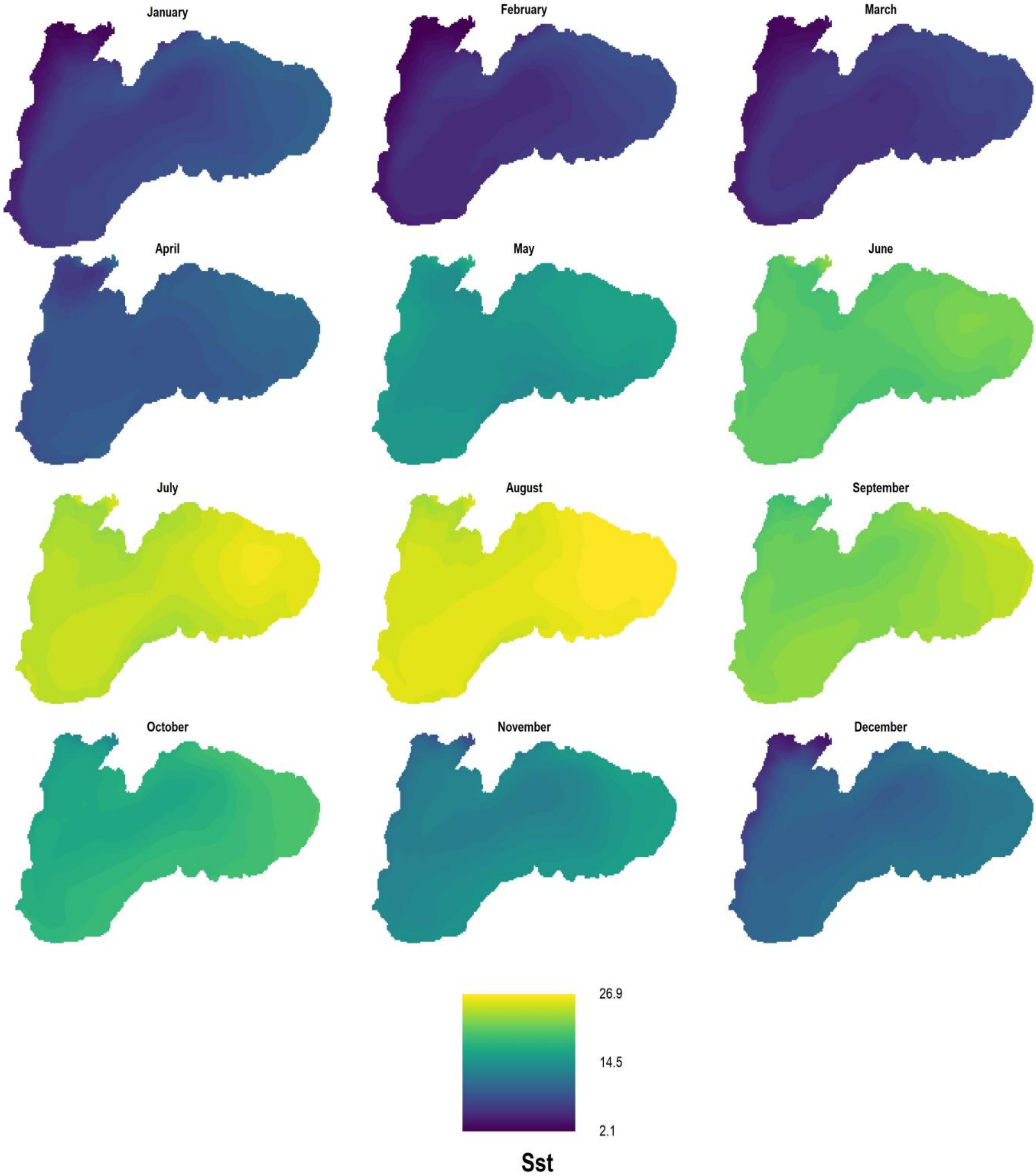

Figure I-12. Plots of monthly climatologies of sea surface temperature for the Black Sea.

2.1.11. Climatologies of sea surface temperaturestandard deviation

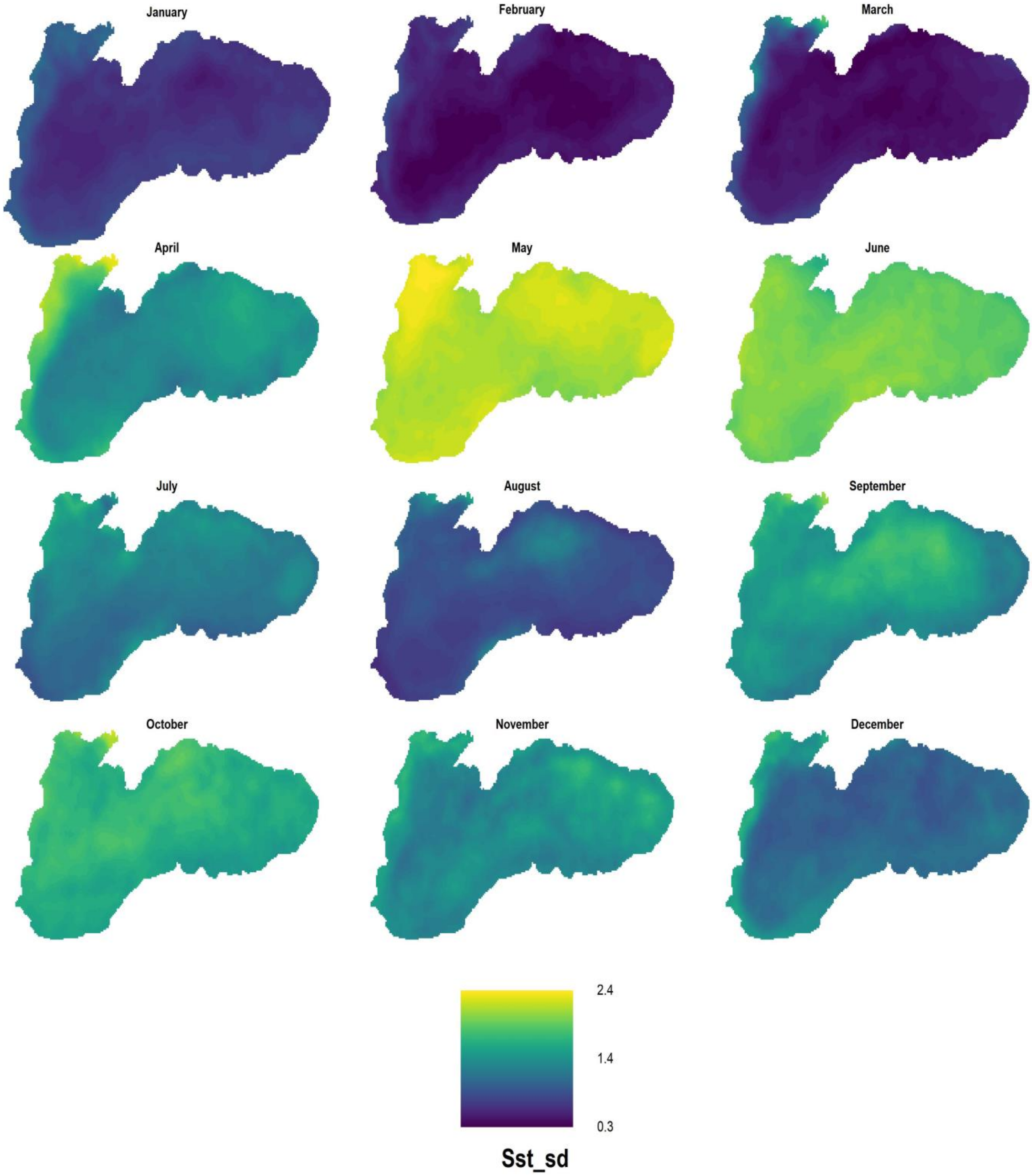

Figure I-13. Plots of monthly climatologies of sea surface temperaturestandard deviation for the Black Sea.

2.2. Climatologies of dynamic covariates for the Mediterranean Sea

2.2.1. Climatologies of chlorophyll

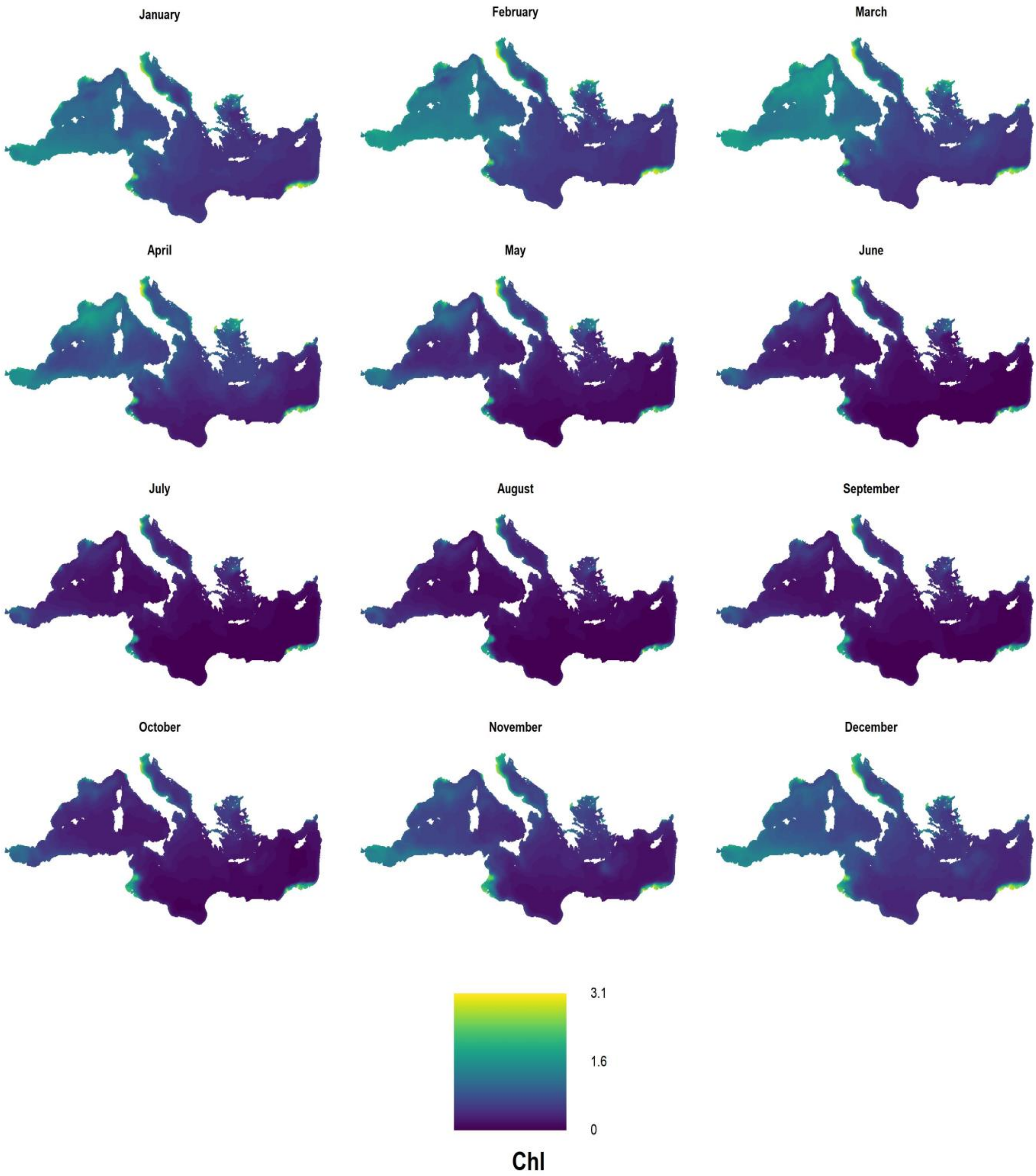

Figure I-14. Plots of monthly climatologies of chlorophyll for the Mediterranean Sea.

2.2.2. Climatologies of chlorophyllfrontdistance

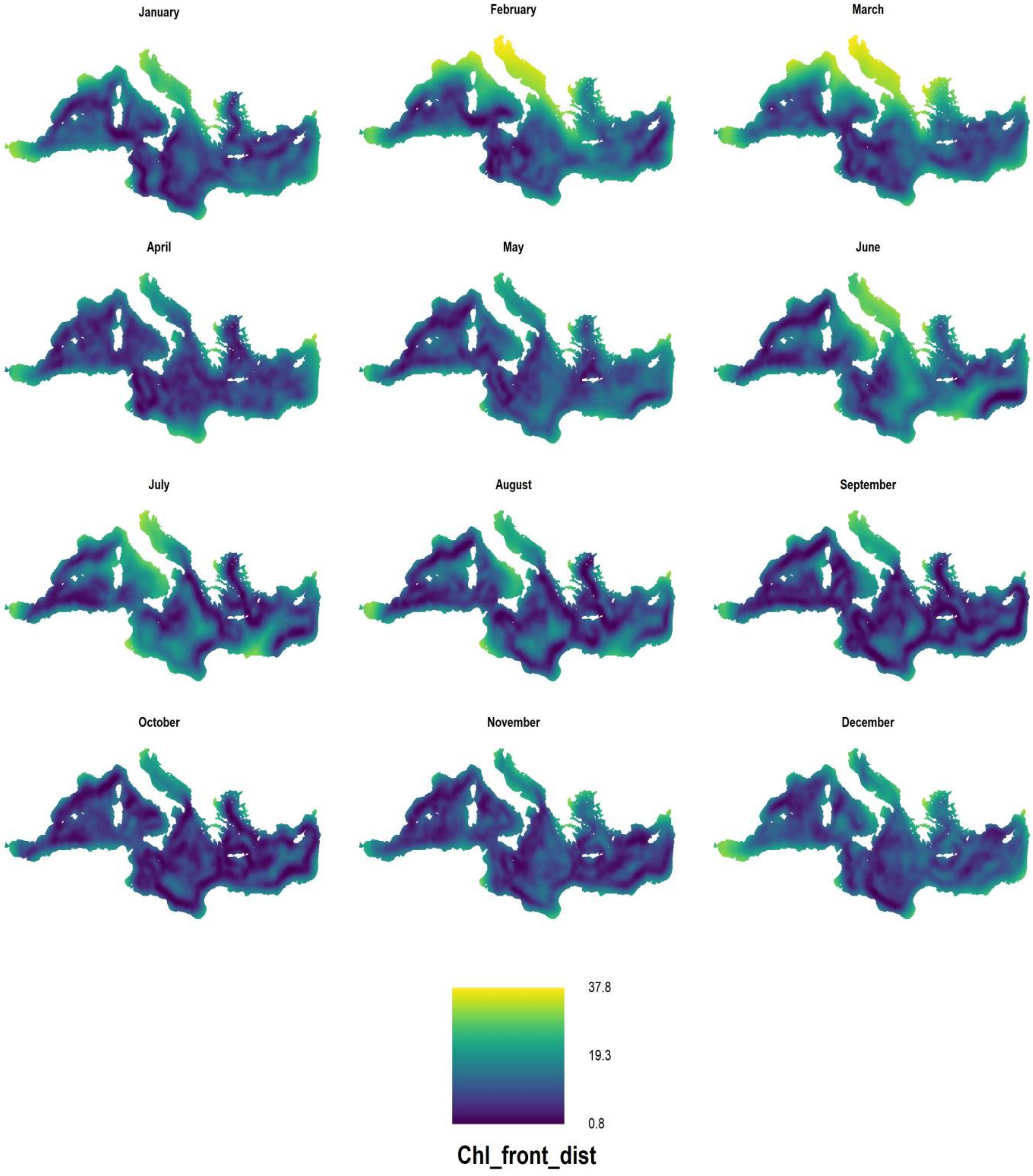

Figure I-15. Plots of monthly climatologies of chlorophyllfrontdistance for the Mediterranean Sea.

2.2.3. Climatologies of chlorophyllfrontstrength

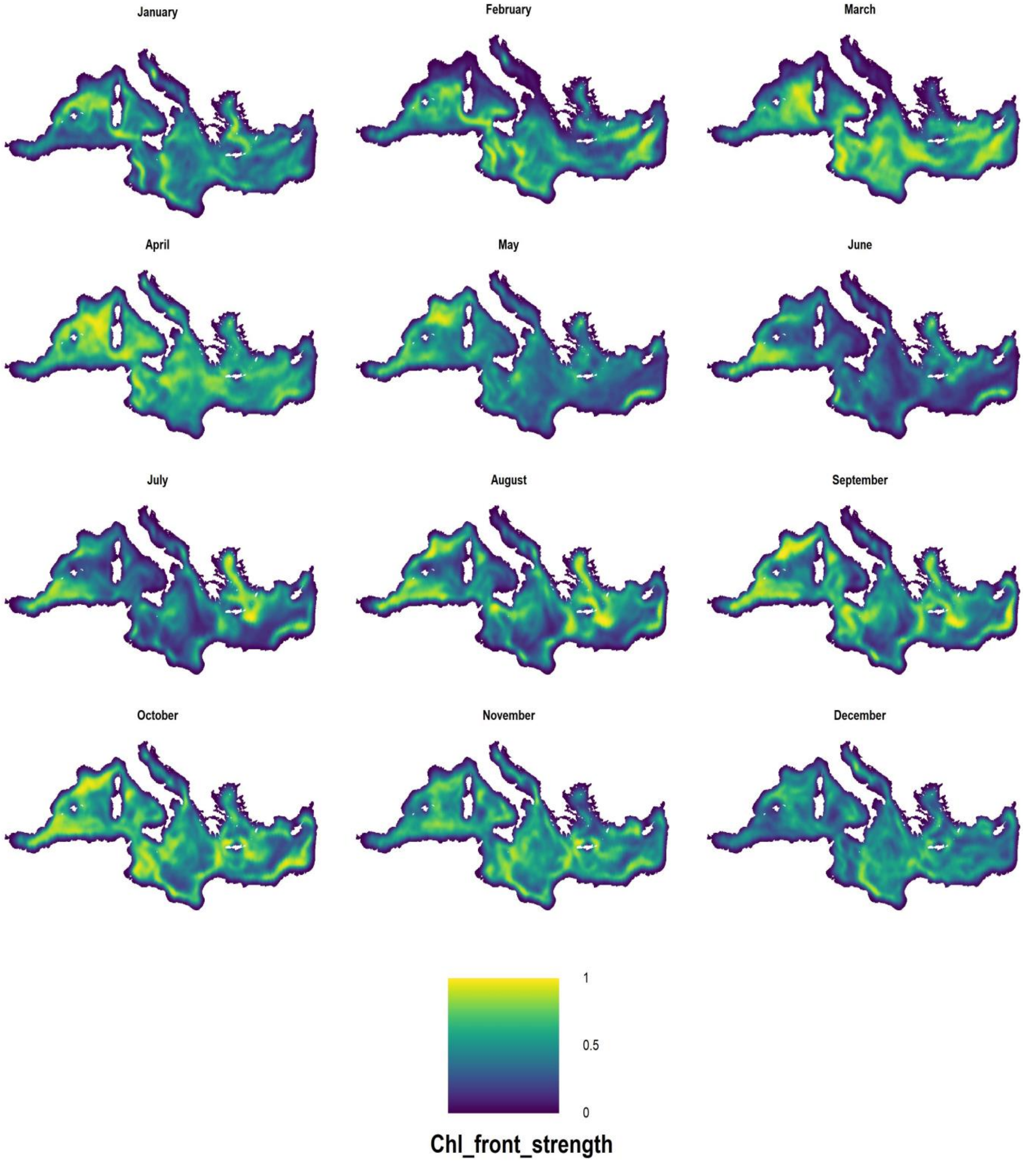

Figure I-16. Plots of monthly climatologies of chlorophyllfrontstrength for the Mediterranean Sea.

2.2.4. Climatologies of mixedlayerthickness

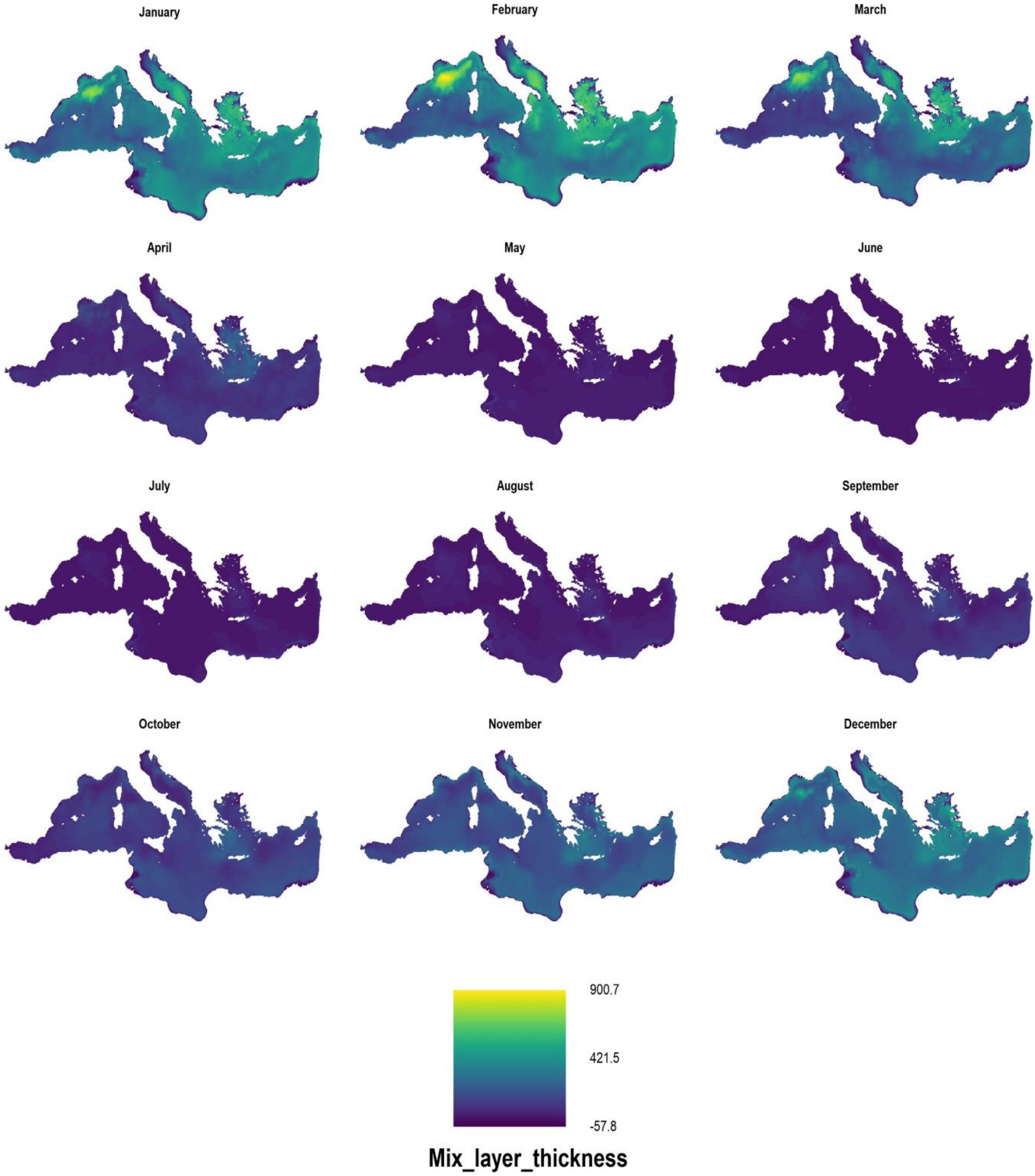

Figure I-17. Plots of monthly climatologies of mixedlayerthickness for the Mediterranean Sea.

2.2.5. Climatologies of primaryproductivity

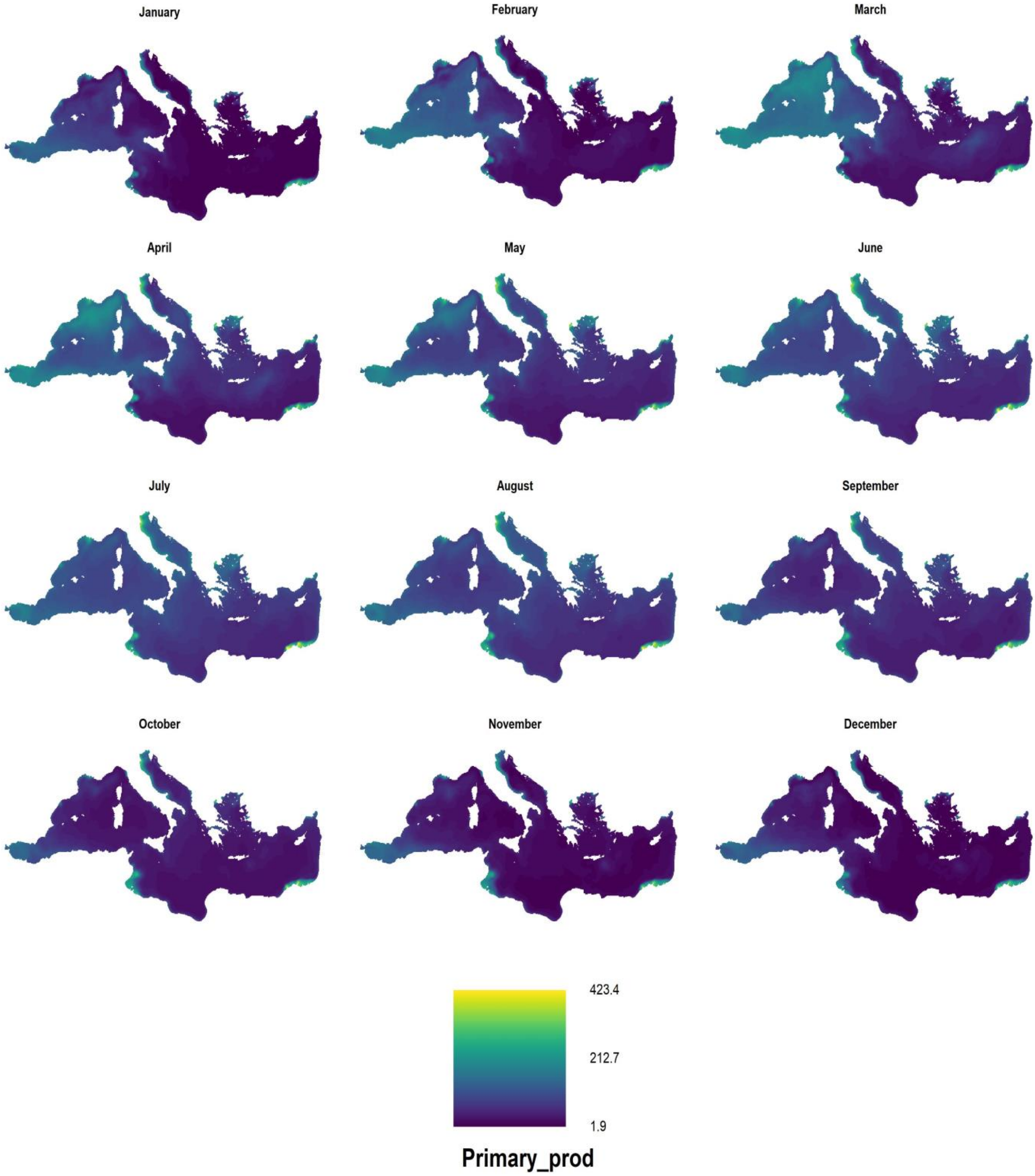

Figure I-18. Plots of monthly climatologies of primaryproductivity for the Mediterranean Sea.

2.2.6. Climatologies of salinity

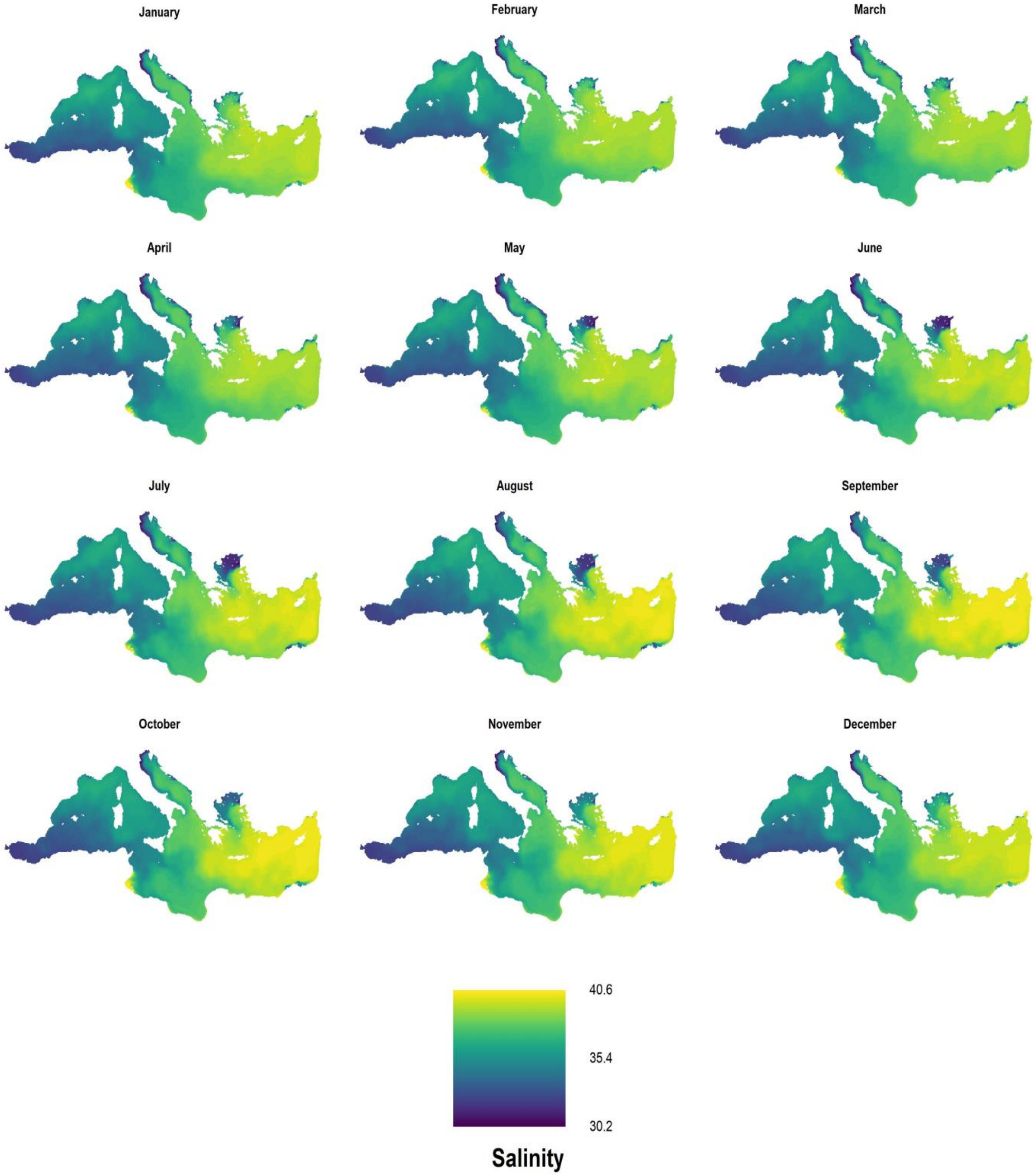

Figure I-19. Plots of monthly climatologies of salinity for the Mediterranean Sea.

2.2.7. Climatologies of sea bottom temperature

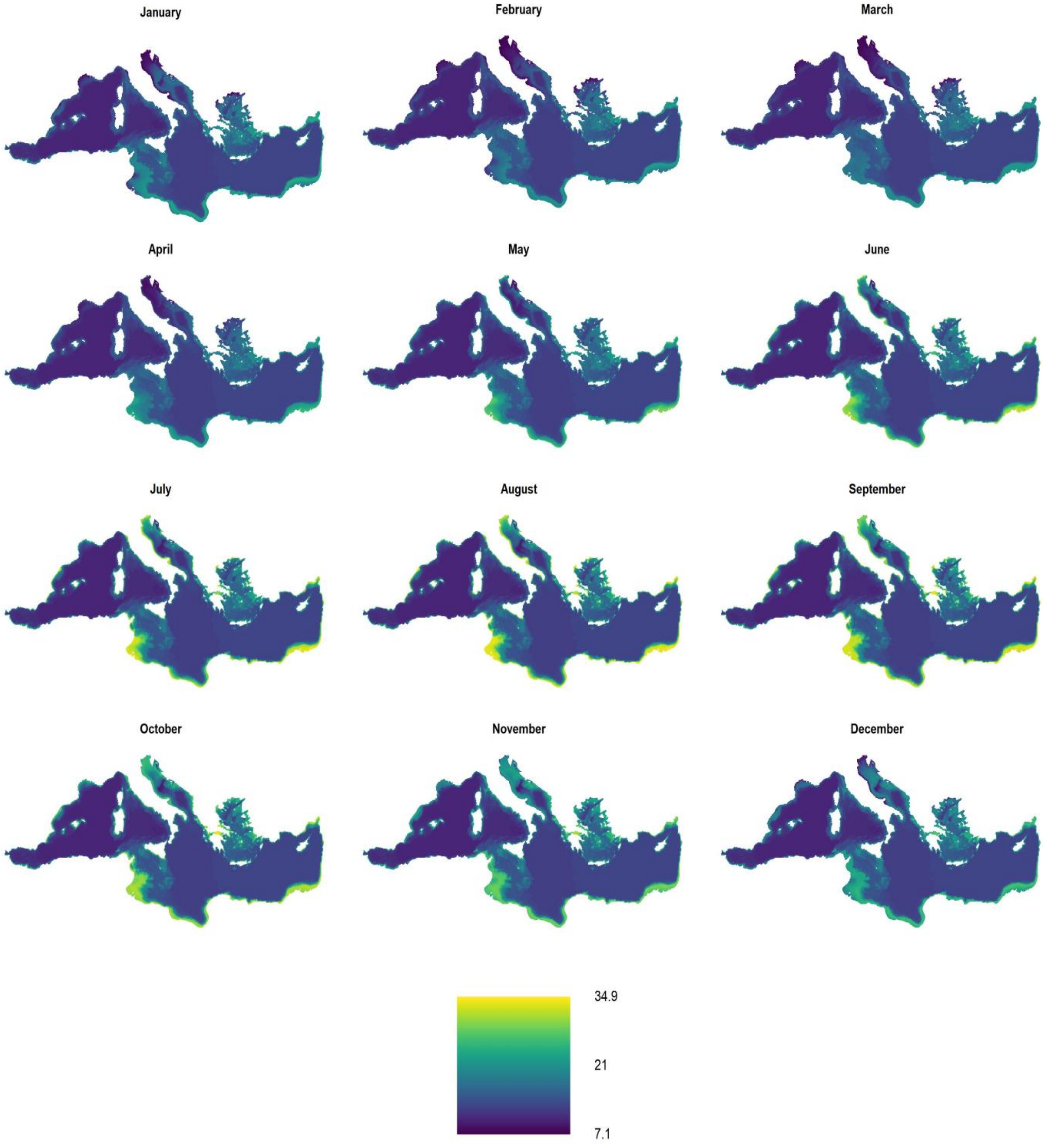

Figure I-20. Plots of monthly climatologies of sea bottom temperature for the Mediterranean Sea.

2.2.8. Climatologies of sea surface height

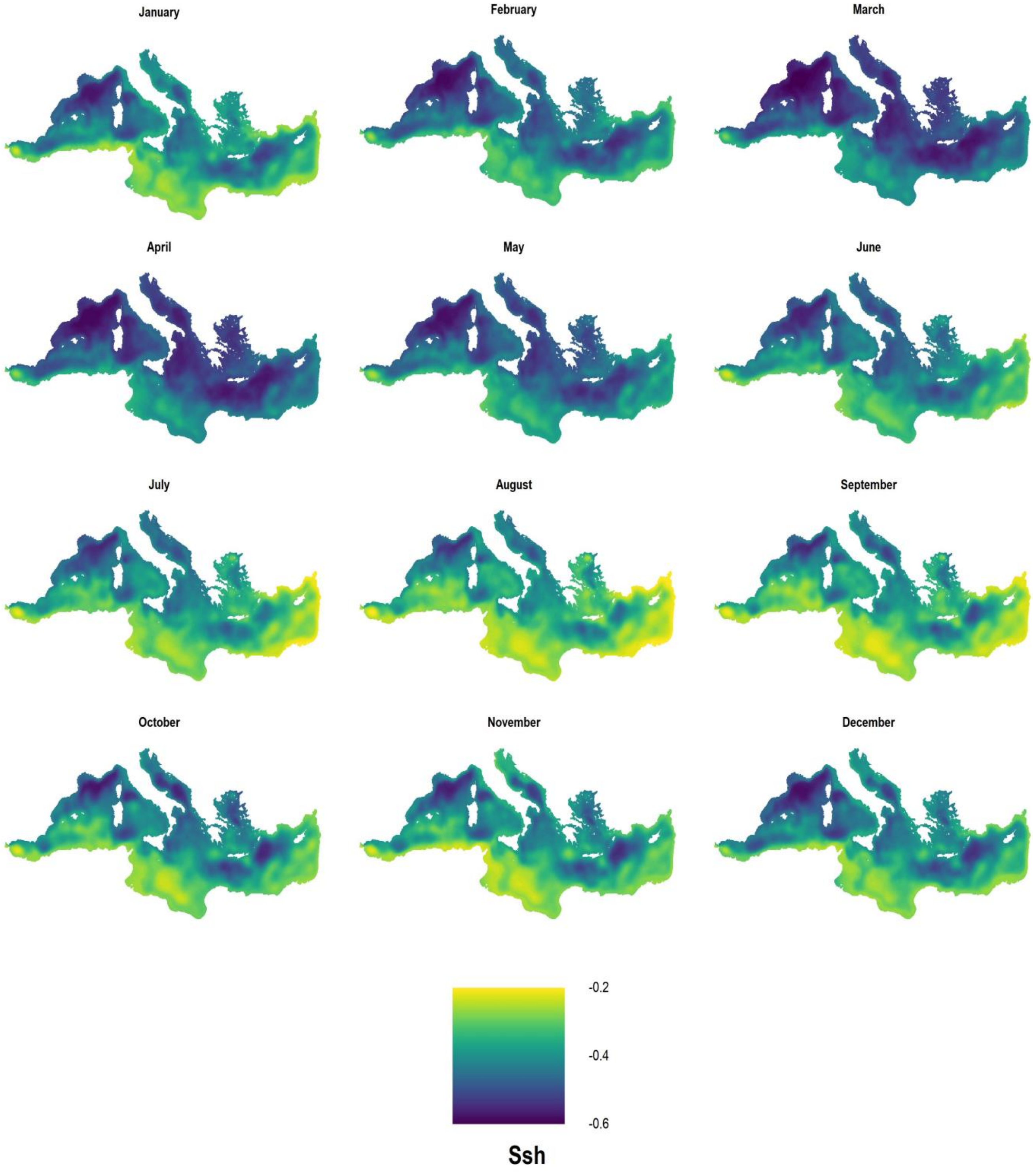

Figure I-21. Plots of monthly climatologies of sea surface height for the Mediterranean Sea.

2.2.9. Climatologies of sea surface temperature

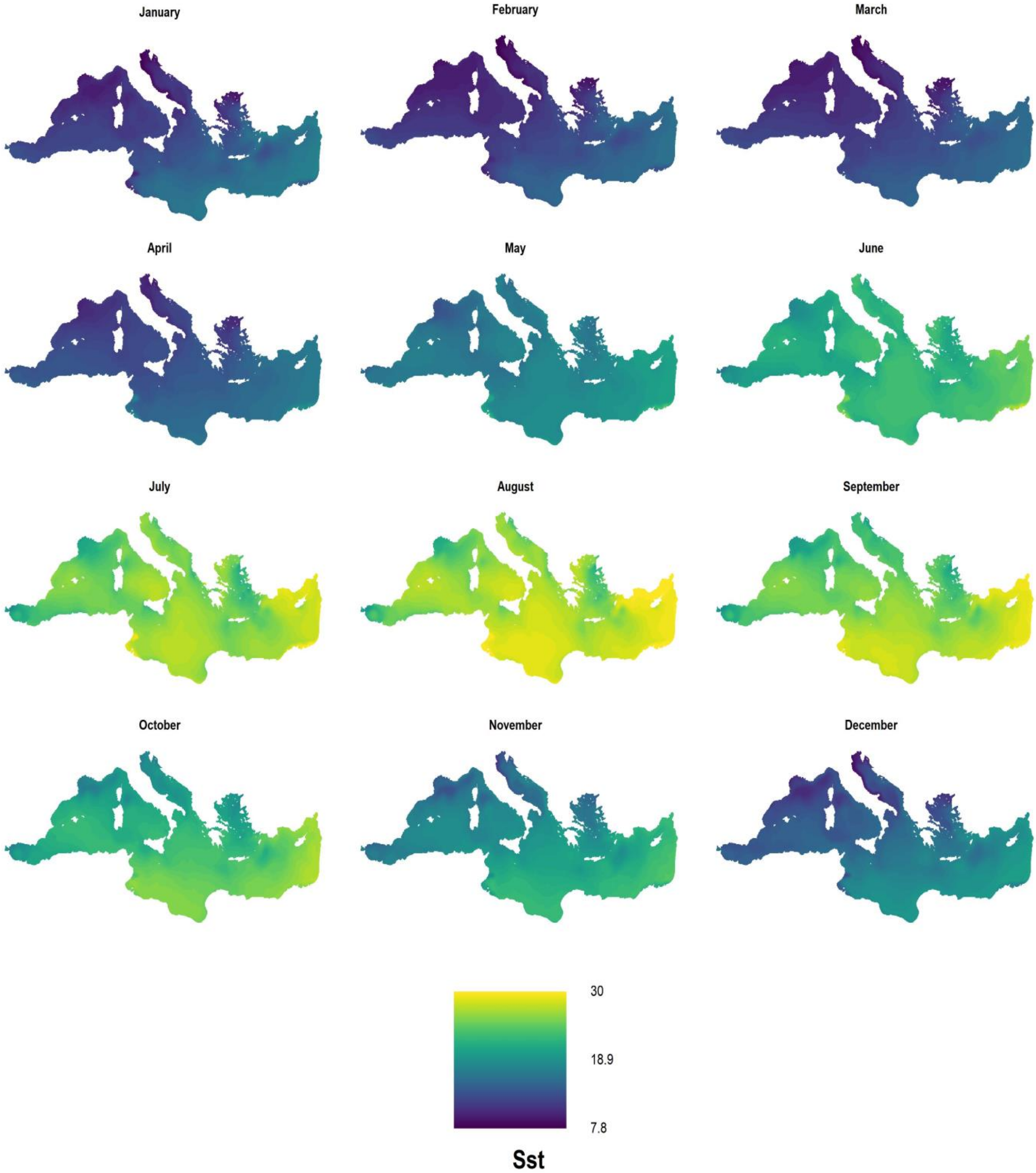

Figure I-22. Plots of monthly climatologies of sea surface temperature for the Mediterranean Sea.

2.2.10. Climatologies of sea surface temperaturefrontdistance

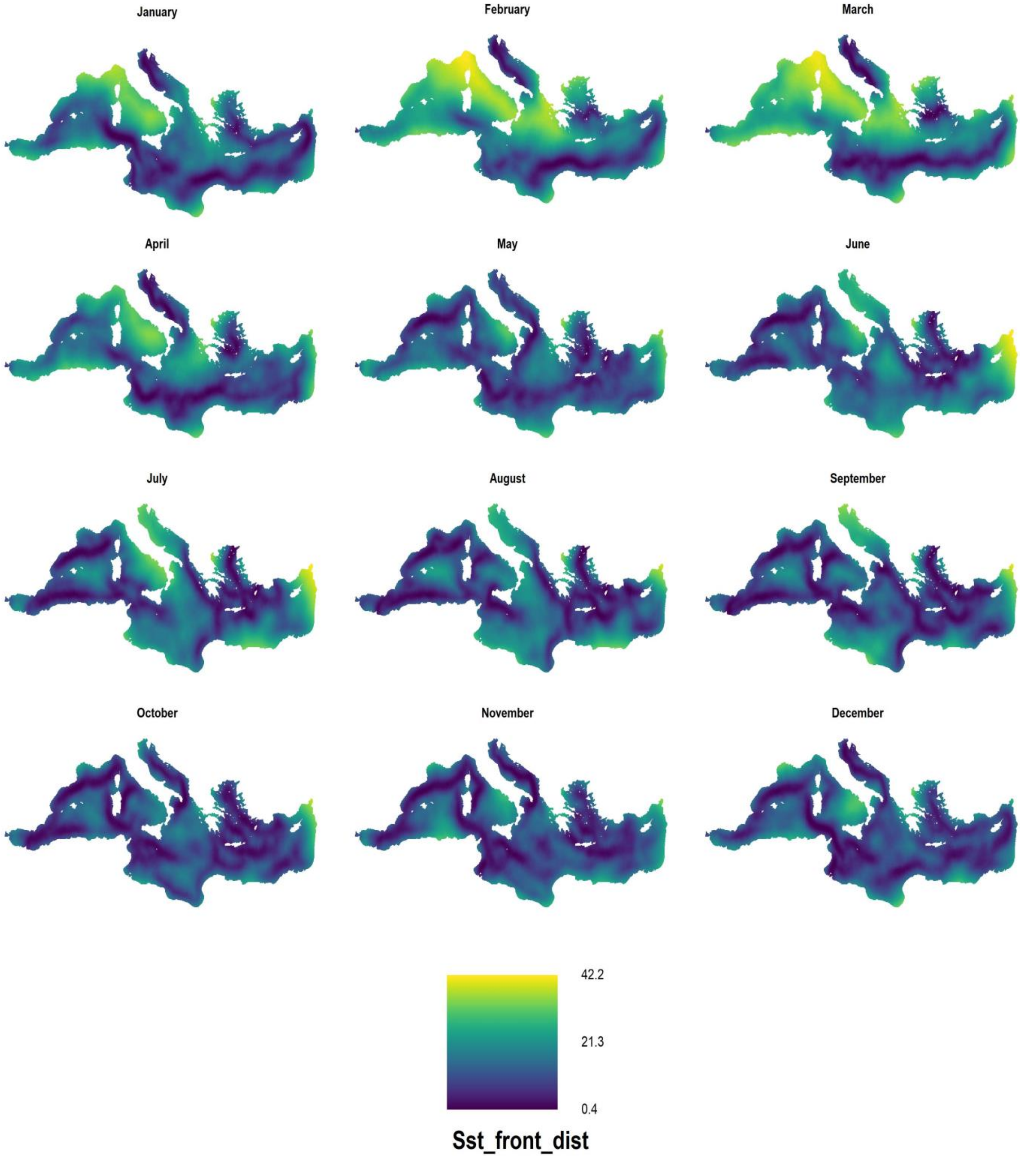

Figure I-23. Plots of monthly climatologies of sea surface temperaturefrontdistance for the Mediterranean Sea.

2.2.11. Climatologies of sea surface temperaturefrontstrength

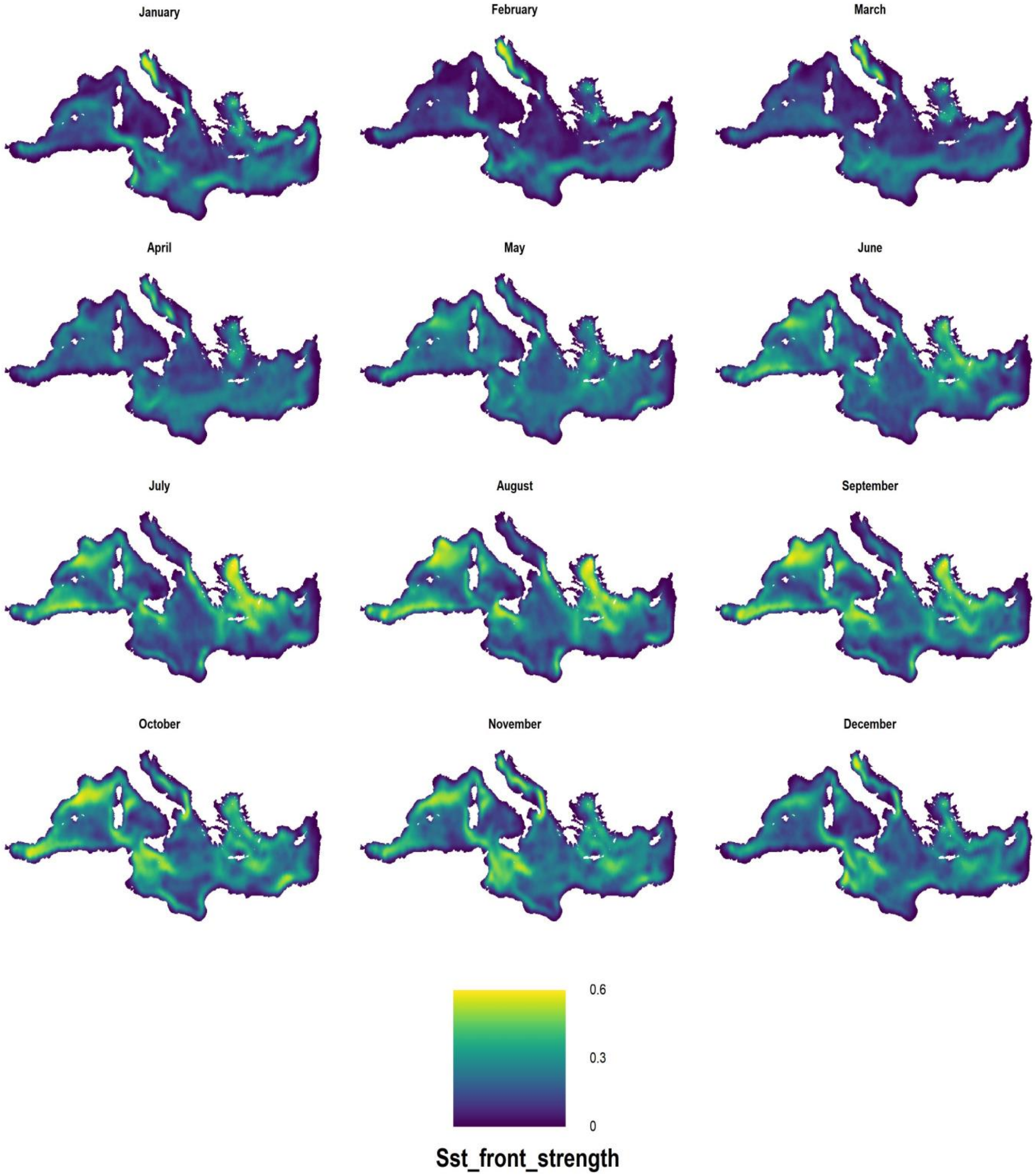

Figure I-24. Plots of monthly climatologies of sea surface temperaturefrontstrength for the Mediterranean Sea.

2.2.12. Climatologies of sea surface temperaturestandard deviation

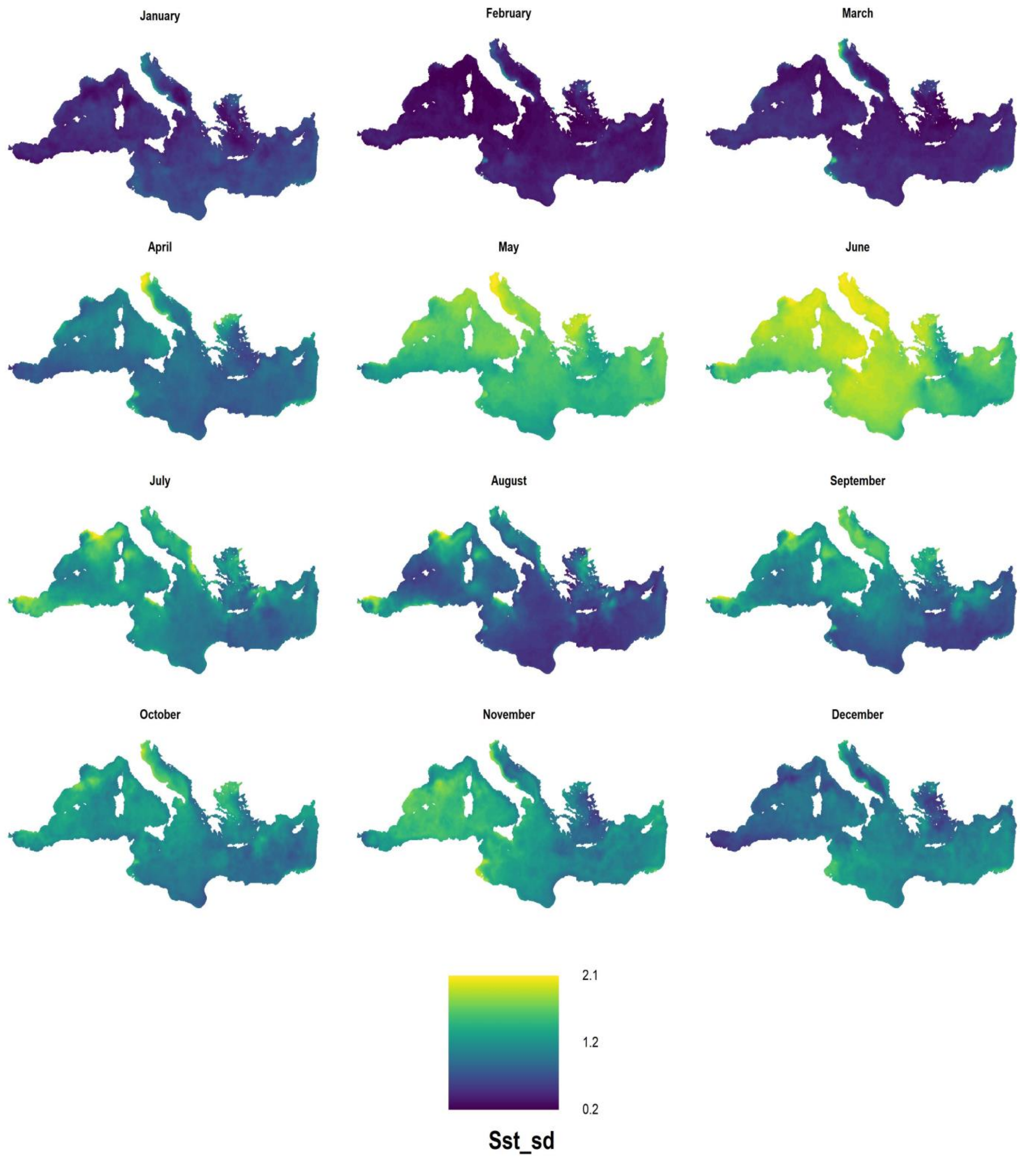

Figure I-25. Plots of monthly climatologies of sea surface temperaturestandard deviation for the Mediterranean Sea.