DBS Offshore Wind

RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

The Applicants' Comments on the ExA's Proposed Schedule of Changes to the dDCO

Appendix A - Offshore Ornithology Year 1 and 2 Combined Spatial Plots (Revision 2) (Clean)

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Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
Project:	**Dogger Bank South Offshore Wind Farms**	Sub Project/Package	**Consents**
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01	June 2025	Submission for Deadline 7	RHDHV	RWE	RWE
02	July 2025	Submission for Deadline 8	RHDHV	RWE	RWE

Revision Change Log			
Rev No.	**Page**	**Section**	**Description**
01	N/A	N/A	Submitted for Deadline 7.
02	Various	Throughout	Updates made to provide further detail following feedback received from Natural England via email on 1st July 2025.

Contents

Plates

Glossary

Term	Definition
Array Areas	The DBS East and DBS West offshore Array Areas, where the wind turbines, offshore platforms and array cables would be located. The Array Areas do not include the Offshore Export Cable Corridor or the Inter-Platform Cable Corridor within which no wind turbines are proposed. Each area is referred to separately as an Array Area.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Preliminary Environmental Information Report (PEIR)	Defined in the EIA Regulations as information referred to in part 1, Schedule 4 (information for inclusion in environmental statements) which has been compiled by the applicants and is reasonably required to assess the environmental effects of the development.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).

Acronyms

Acronym	Definition
DBS	Dogger Bank South
DCO	Development Consent Order
ES	Environmental Statement
PEIR	Preliminary Environmental Information Report
TCE	The Crown Estate

1 Offshore Ornithology Year 1 and 2 Combined Spatial Plots

1.1 Introduction

1. This document has been produced in support of **The Applicants' Comments on the ExA's Proposed Schedule of Changes to the dDCO** [document reference 17.3], in particular regarding the Applicants' response to the Examining Authority's comments on Schedule 10 DML1 - Part 2, 20(4)(e), Schedule 11 DML2 - Part 2, 20(4)(e), Schedule 12 DML3 - Part 2, 18(4)(e) and Schedule 13 DML4 - Part 2, 18(4)(e).
2. This document provides examples of the site-specific aerial survey data that was collated and examined (pre-application) to indicate what (if any) areas within The Crown Estate lease options showed higher and lower densities of birds. These data were then used to support the refinement of the Array Areas that took place following the submission of the Projects Preliminary Environmental Information Report (PEIR) and prior to the submission of the Environmental Statement (ES) (see section 4.7.1 of **Chapter 4 - Site Selection and Assessment of Alternatives (Revision 3)** [document reference 7.4] for further information).
3. Following Natural England feedback (1st July 2025 via email) this document has been updated to provide further detail:
    - Separate Year 1 and Year 2 modelling for each species
    - Separate Year 1 and Year 2 raw counts for each species (i.e. monthly observations)
4. Natural England also requested additional modelling be undertaken noting that the Applicants had used generic 'breeding' and 'non-breeding' seasons (breeding was as April to August) instead of using the species-specific seasons. This exercise would require additional modelling to be undertaken for which there is insufficient time available to meet submission deadlines and allow feedback. In addition, the Applicants highlight that given the variability of seabird distributions through time, these monthly snapshots are not considered to represent static and consistent locations, therefore additional modelling is not considered worthwhile. However, the raw data of monthly locations provided offers very similar information should it be required.

1.2 Modelling undertaken

5. The spatial models were fitted to the survey data using the MRSea package in R[1]. This analysis package was developed by statistical modellers at the University of St. Andrews under contract to the Scottish Government and provides a recognised spatial modelling tool for use with digital aerial survey data collected at offshore wind farm sites and is the standard method used in the UK for this purpose.

6. Spatial modelling relates observed seabird locations (e.g. obtained from survey data) to explanatory factors and then uses the statistical relationships (between seabird locations and each explanatory variable) to predict seabird densities in areas not surveyed but for which explanatory predictor values are available. In the current context this provides a form of interpolation between transect lines and hence a modelled density surface across the whole survey area.

7. The hotspot modelling was conducted to determine if there were any areas of consistent seabird presence within the confines of the overall survey area, and therefore the only explanatory factor used was a spatial smoother term (expressed as 's(x,y)'). While other factors such as distance to coast and sea depth can also be considered, the primary benefit of their inclusion is to be able to make predictions *beyond* the surveyed area, rather than within it (as here). Consequently, there would be little benefit from their inclusion for the purposes of hotspot identification.

1.3 Summary of Observations

8. For each species considered in this document, three spatial models were fitted – annual, breeding (April-August) and nonbreeding (September-March). Survey data was combined for all the months in each period, and both years for the combined outputs.

9. In general, species abundance was higher in the nonbreeding than the breeding season.

10. The Applicants note that composite 'distributions' which combine observations from different surveys and years (as shown in this document) can be hard to interpret as the distribution on each survey typically differs. Thus a 'hotspot' on a seasonal map often reflects a peak on one survey rather than a consistent preference.

11. The heat map values show abundance, but these are a sum across the months included so are **not true** abundance estimates.

12. Data were only collected within the 4km buffer of The Crown Estate (TCE) Round 4 lease option area. Therefore, hotspots outside the buffer are model extrapolations, NOT real – there is no way of knowing if there were birds in these locations.

[1] https://www.creem.st-andrews.ac.uk/software/mrsea-and-mrseapower/

1.4 Gannet

13. **Plates 1-1** to **1-3** below detail the spatial plots of gannet within the TCE Round 4 lease option area assessed at the Preliminary Environmental Information Report (PEIR) stage of the Projects, with the refined Array Areas overlain. These plots are based on the combined Year 1 and Year 2 survey data obtained during the digital aerial surveys undertaken for the Projects. These plots present the abundance of gannet within the TCE leasing area / Dogger Bank South (DBS) East and DBS West Array Areas annually (**Plate 1-1**), during the breeding season and non-breeding season (**Plate 1-3**). The Projects' refined Array Areas have been overlain to highlight how the changes were made between PEIR and Application stages.
14. Following Natural England feedback, the Applicants have also included the separate Year 1 survey data (**Plate 1-4**) and Year 2 survey data (**Plate 1-5**).
15. As detailed in **Plates 1-1** to **1-3**, while gannets were fairly evenly distributed across the Array Areas across the year, higher densities of gannet were observed at the previous boundary between the TCE leasing areas. As a result of the Array Area refinement conducted pre-Development Consent Order (DCO) application (which took into account this information as well as other considerations), these higher density areas of gannet presence have largely been avoided.
16. In addition, **Plate 1-6** to **Plate 1-8** present the raw observations of gannet across the TCE leasing areas for each month of the year, for Year 1 alone, Year 2 alone and Year 1 and Year 2 combined survey data . These raw counts provide further evidence that gannet are fairly evenly distributed across the Array Areas annually.

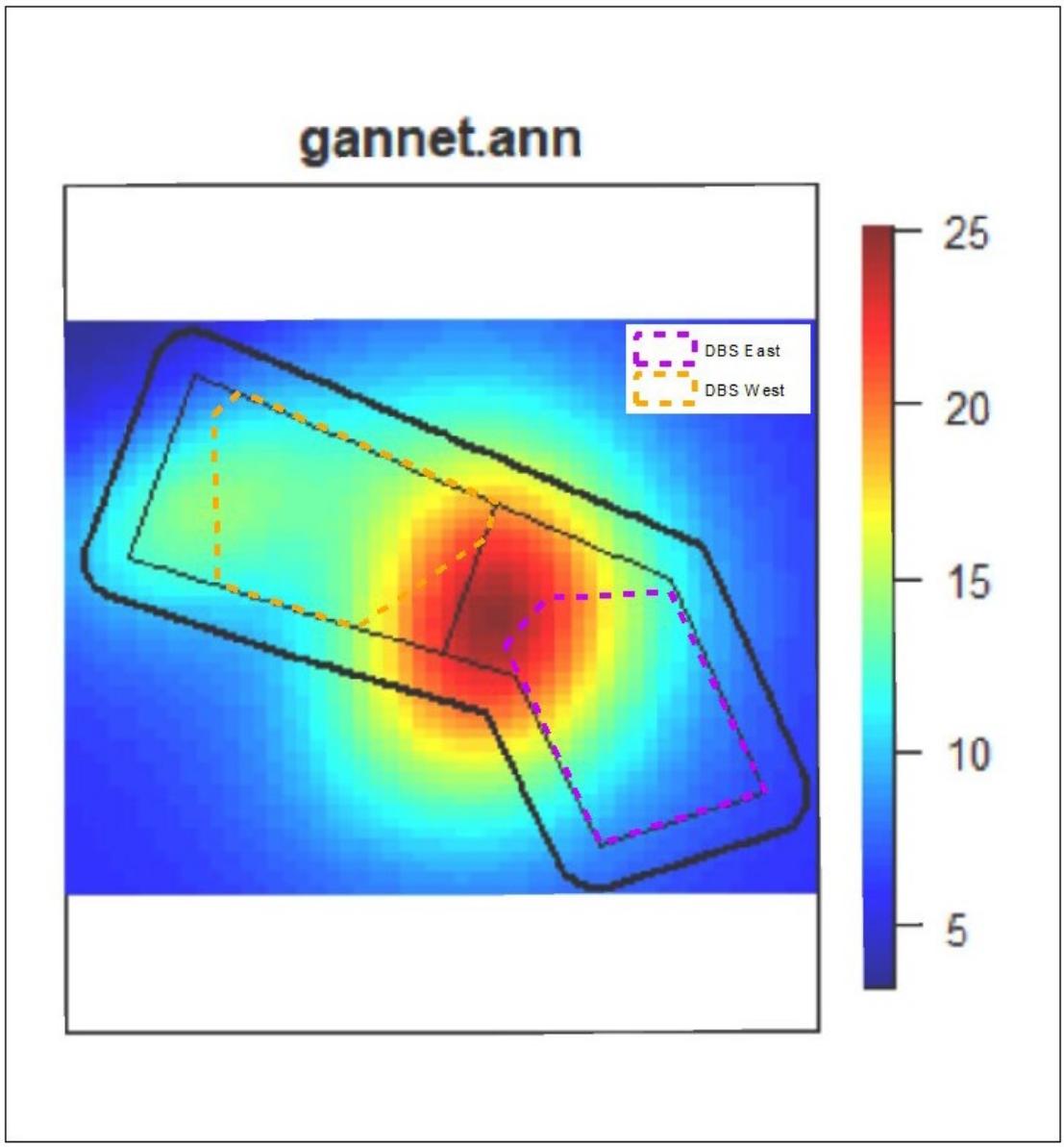

Plate 1-1 Spatial Distribution of Gannet Annually Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)[2]

[2] The unit of measurement on the Y-Axis of this Plate and all remaining Plates in this Appendix refer to the number of observations made of individuals during the digital aerial surveys undertaken for the Projects.

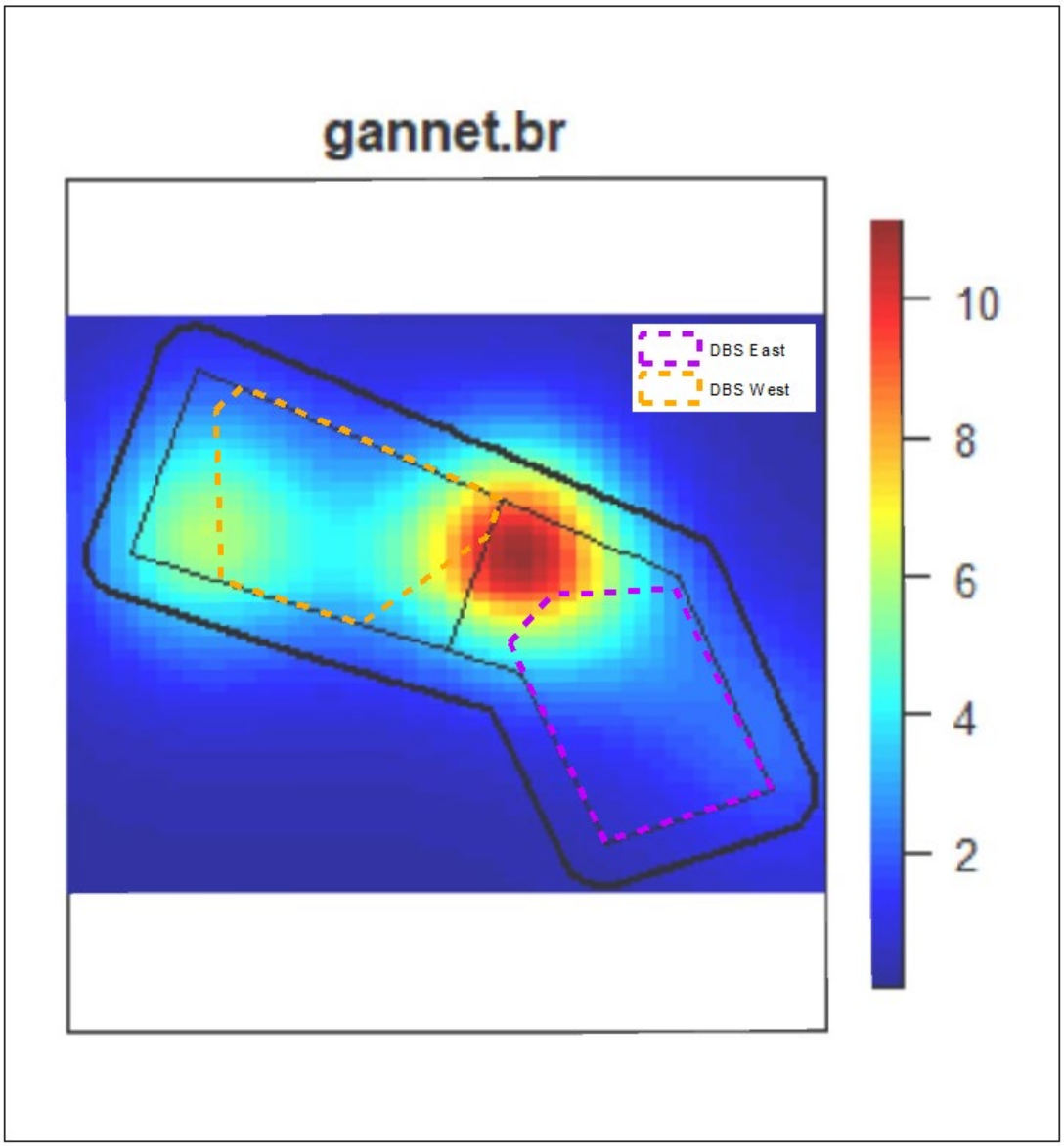

Plate 1-2 Spatial Distribution of Gannet During Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

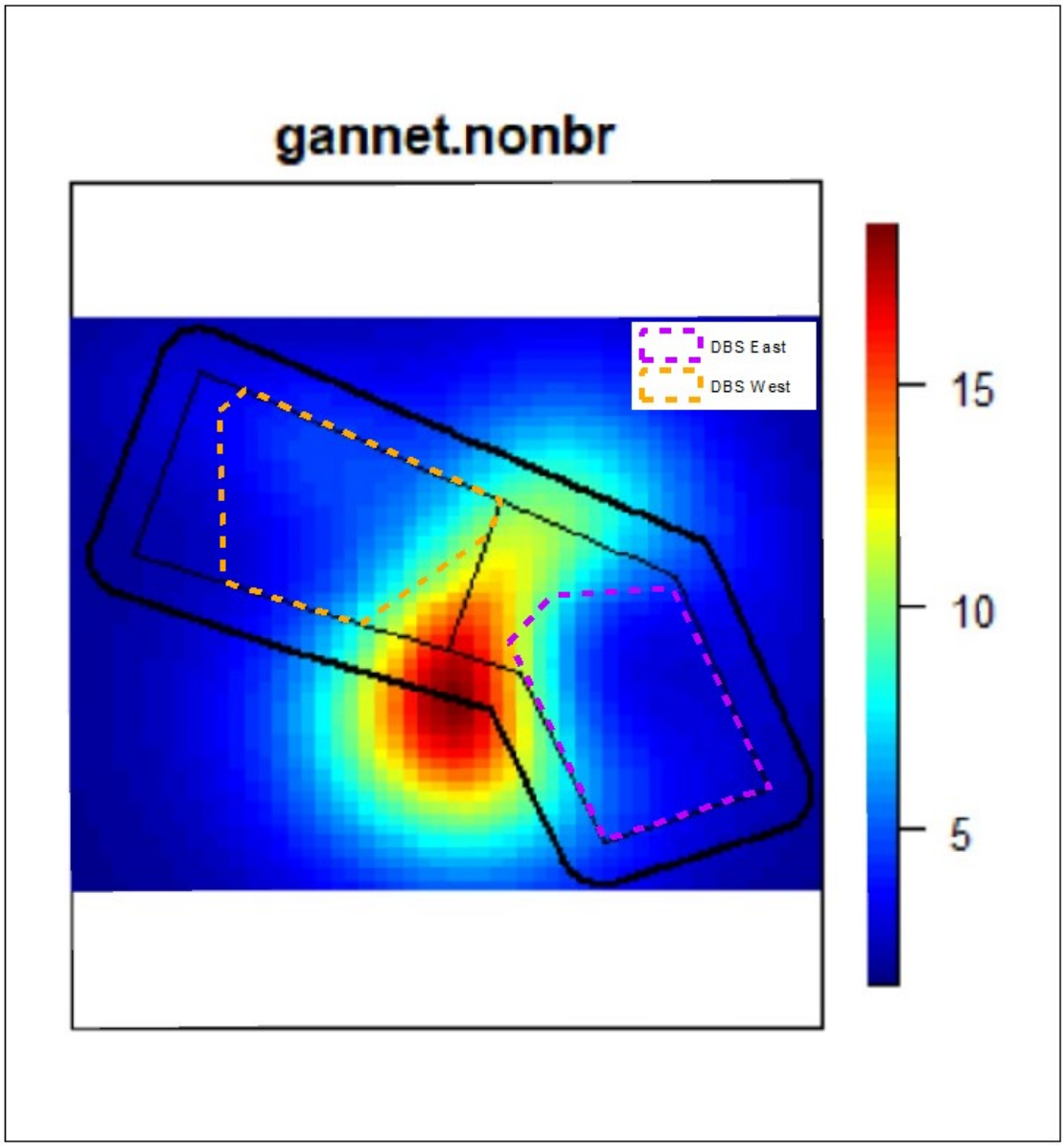

Plate 1-3 Spatial Distribution of Gannet During Non-Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

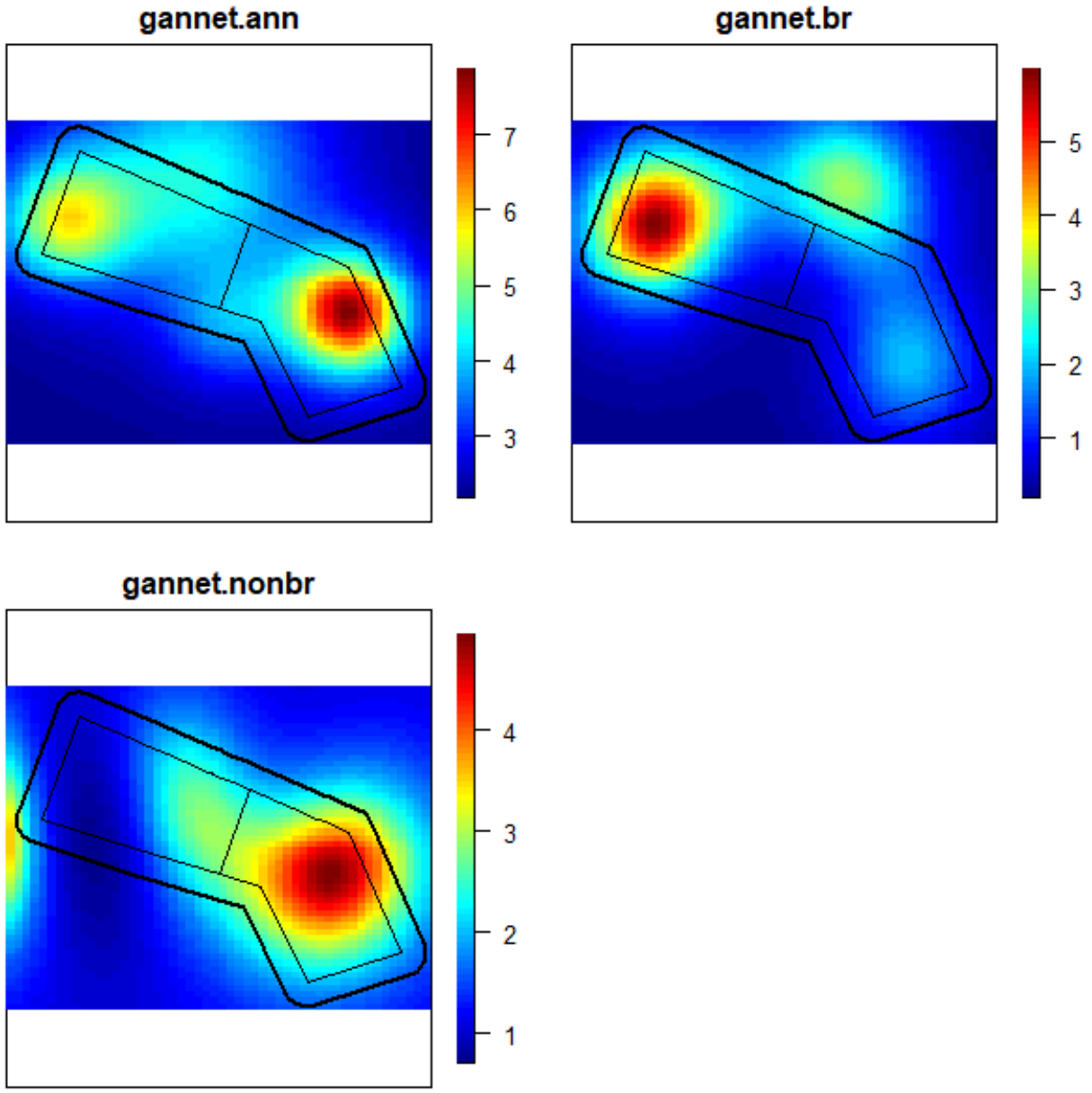

Plate 1-4 Spatial Distribution of Gannet Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 1 Survey Data)

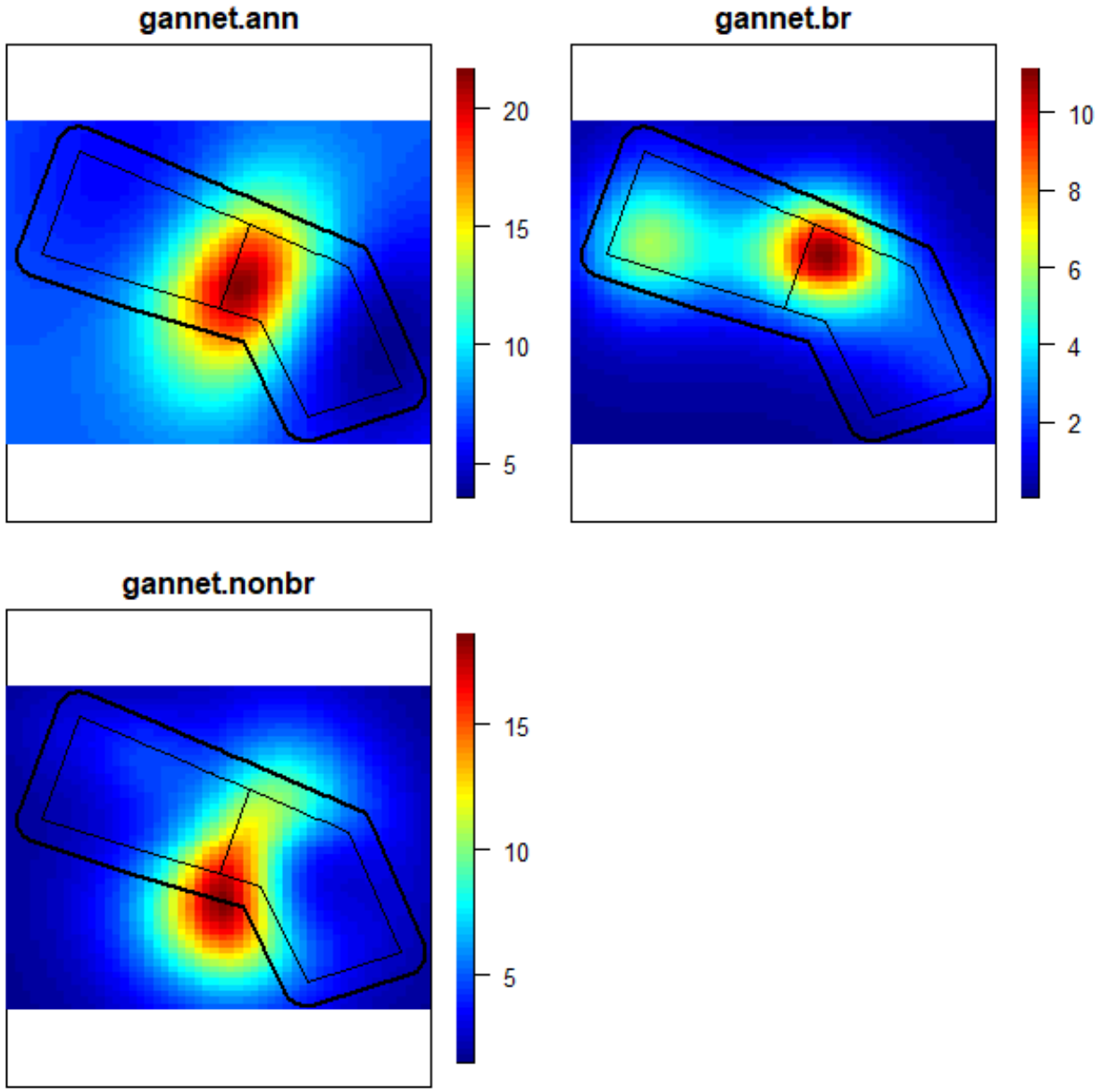

Plate 1-5 Spatial Distribution of Gannet Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 2 Survey Data)

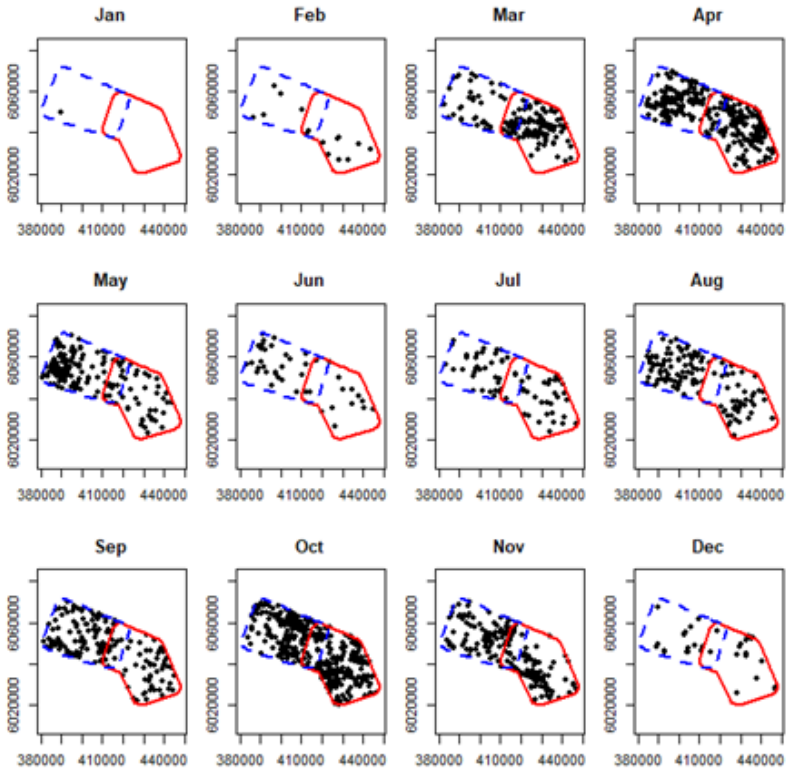

Plate 1-6 Plot of Raw Observations of Gannet Across Each Month, Year 1 and Year 2 Survey Data Combined

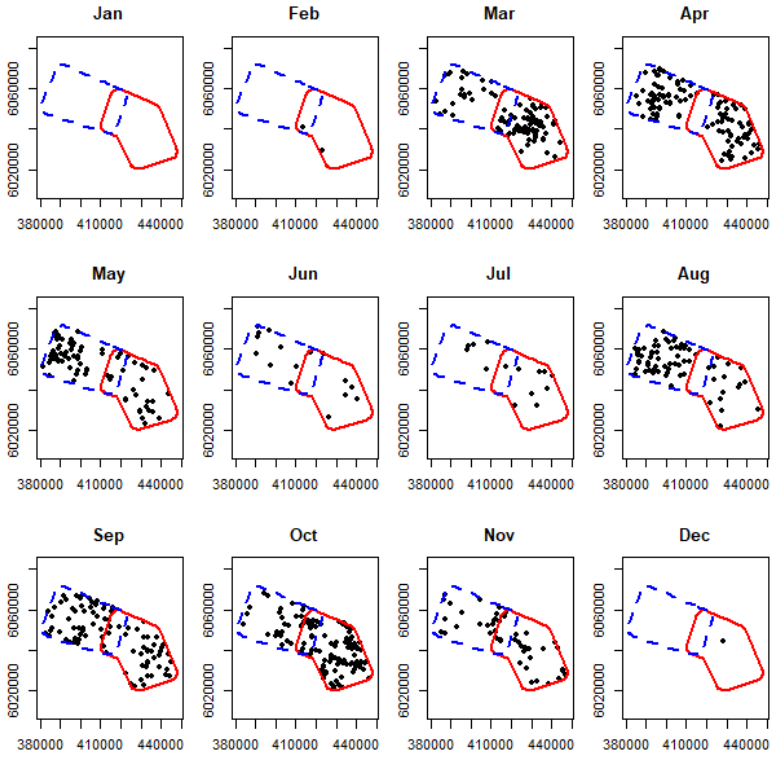

Plate 1-7 Plot of Raw Observations of Gannet Across Each Month, Year 1 Survey Data

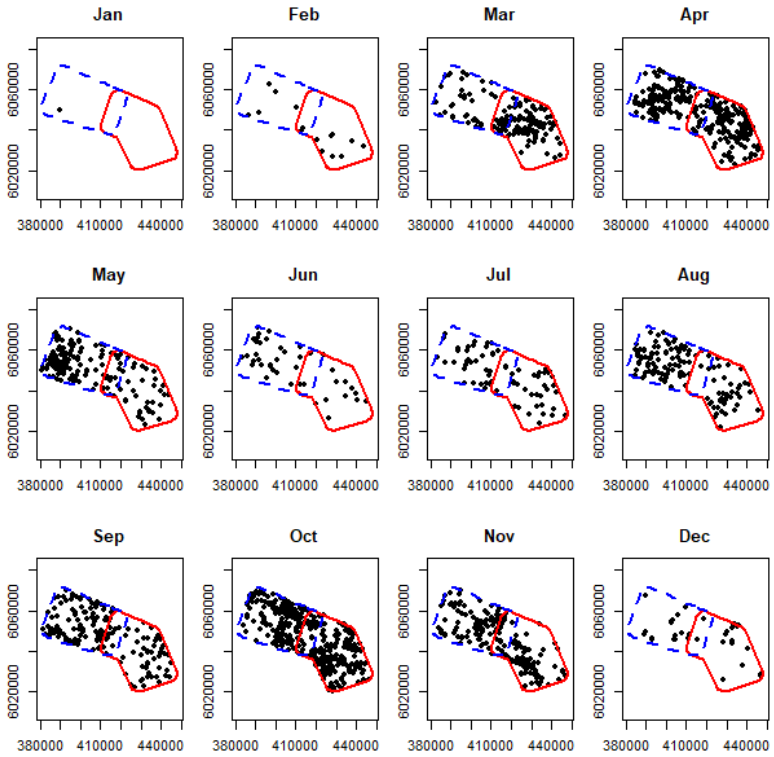

Plate 1-8 Plot of Raw Observations of Gannet Across Each Month, Year 2 Survey Data

1.5 Kittiwake

17. **Plate 1-9** to **Plate 1-11** below detail the spatial plots of kittiwake within the TCE Round 4 lease option area assessed at the PEIR stage of the Projects, with the refined Array Areas overlain. These plots are based on the combined Year 1 and Year 2 survey data obtained during the digital aerial surveys undertaken for the Projects. These plots present the abundance of kittiwake within the TCE leasing area annually (**Plate 1-9**), during the breeding season (**Plate 1-10)** and non-breeding season (**Plate 1-11**). The Projects refined Array Areas have been overlain to highlight how the changes were made between PEIR and Application stages.

18. Following Natural England feedback, the Applicants have also included the separate Year 1 survey data (**Plate 1-12**) and Year 2 survey data (**Plate 1-13**).

19. As detailed in **Plate 1-9** to **Plate 1-11,** while kittiwake were fairly evenly distributed across both Array Areas across the year, higher densities of kittiwake were observed at the to the south of the previous boundary between the TCE leasing areas. As a result of the Array Area refinement conducted pre-Development Consent Order (DCO) application which took into account this information as well as other considerations), these higher density areas of kittiwake presence have largely been avoided.

20. In addition, **Plate 1-15** to **Plate 1-14** below detail the raw observations of kittiwake across the TCE leasing areas for each month of the year, based on the combined Year 1 alone, Year 2 alone, and Year 1 and Year 2 combined survey data.

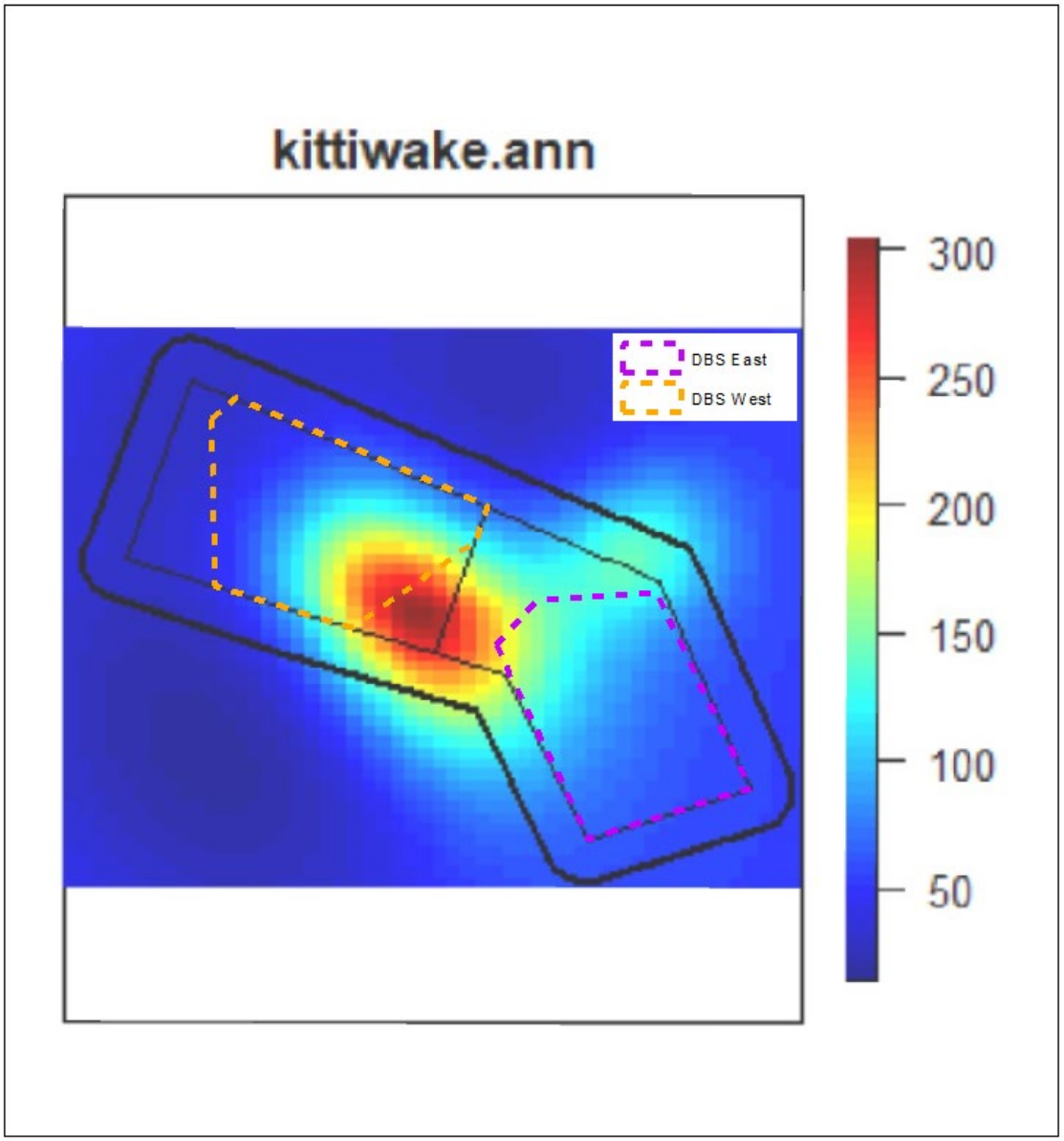

Plate 1-9 Spatial Distribution of Kittiwake Annually Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

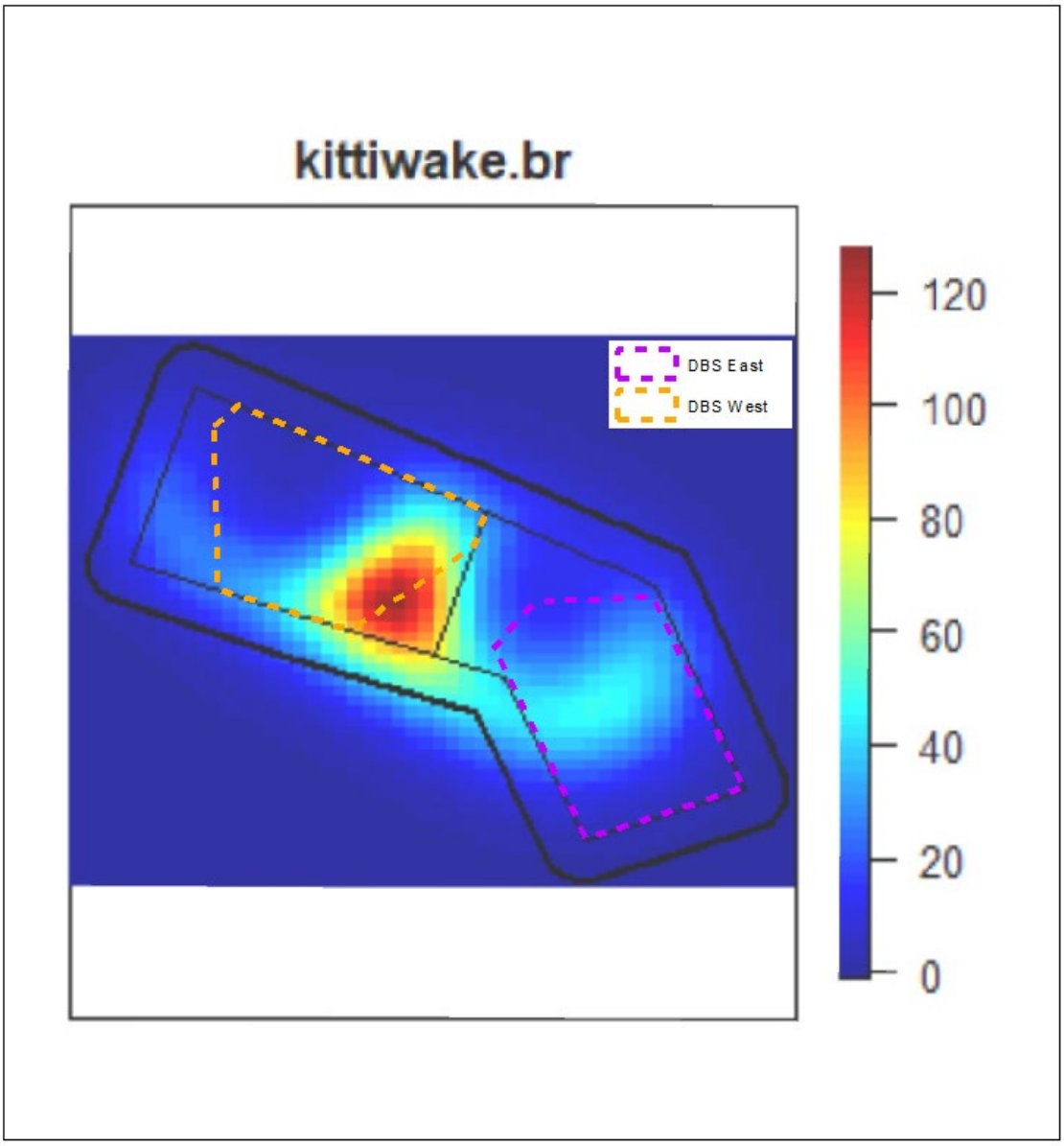

Plate 1-10 Spatial Distribution of Kittiwake During Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

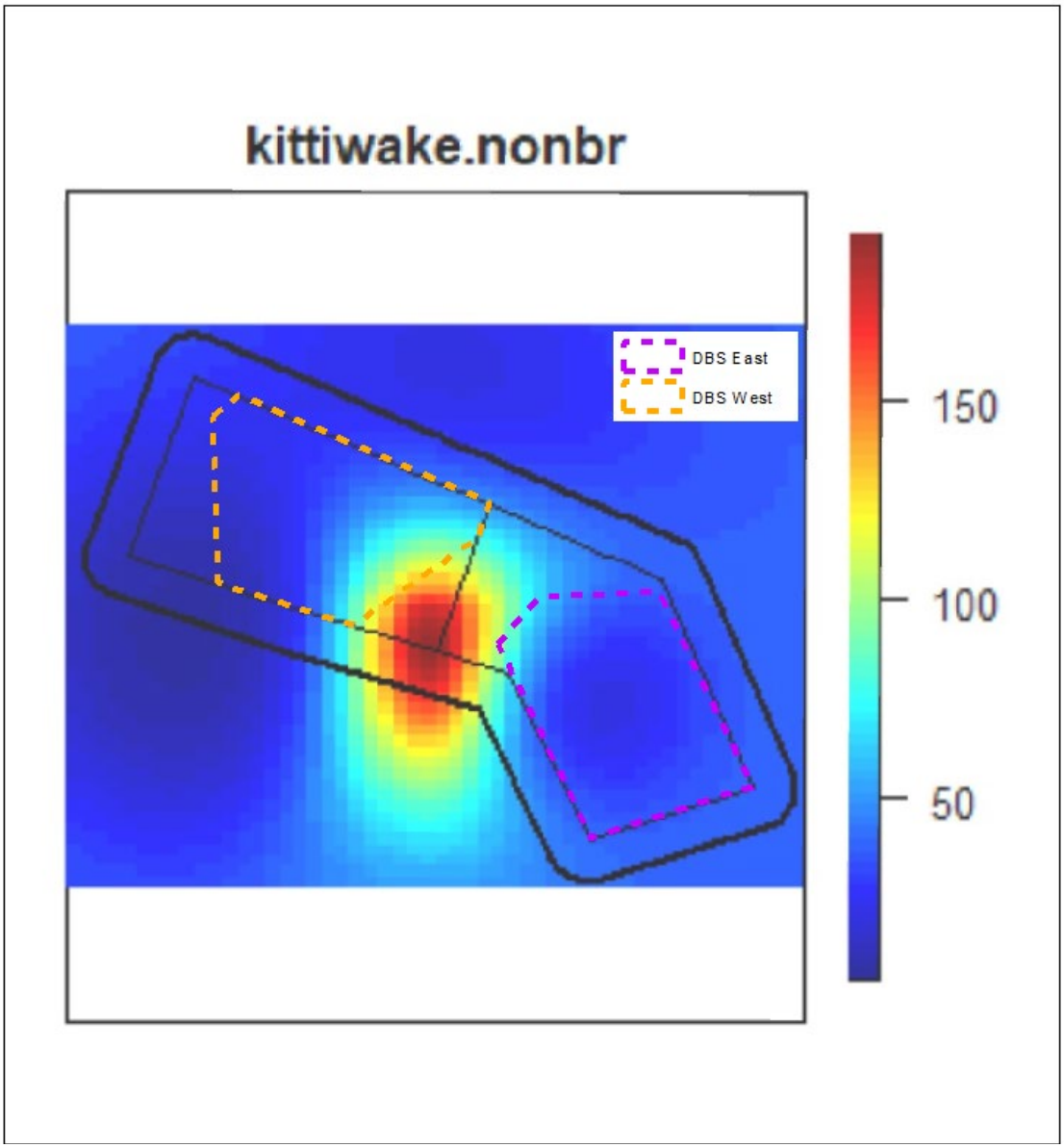

Plate 1-11 Spatial Distribution of Kittiwake During Non-Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

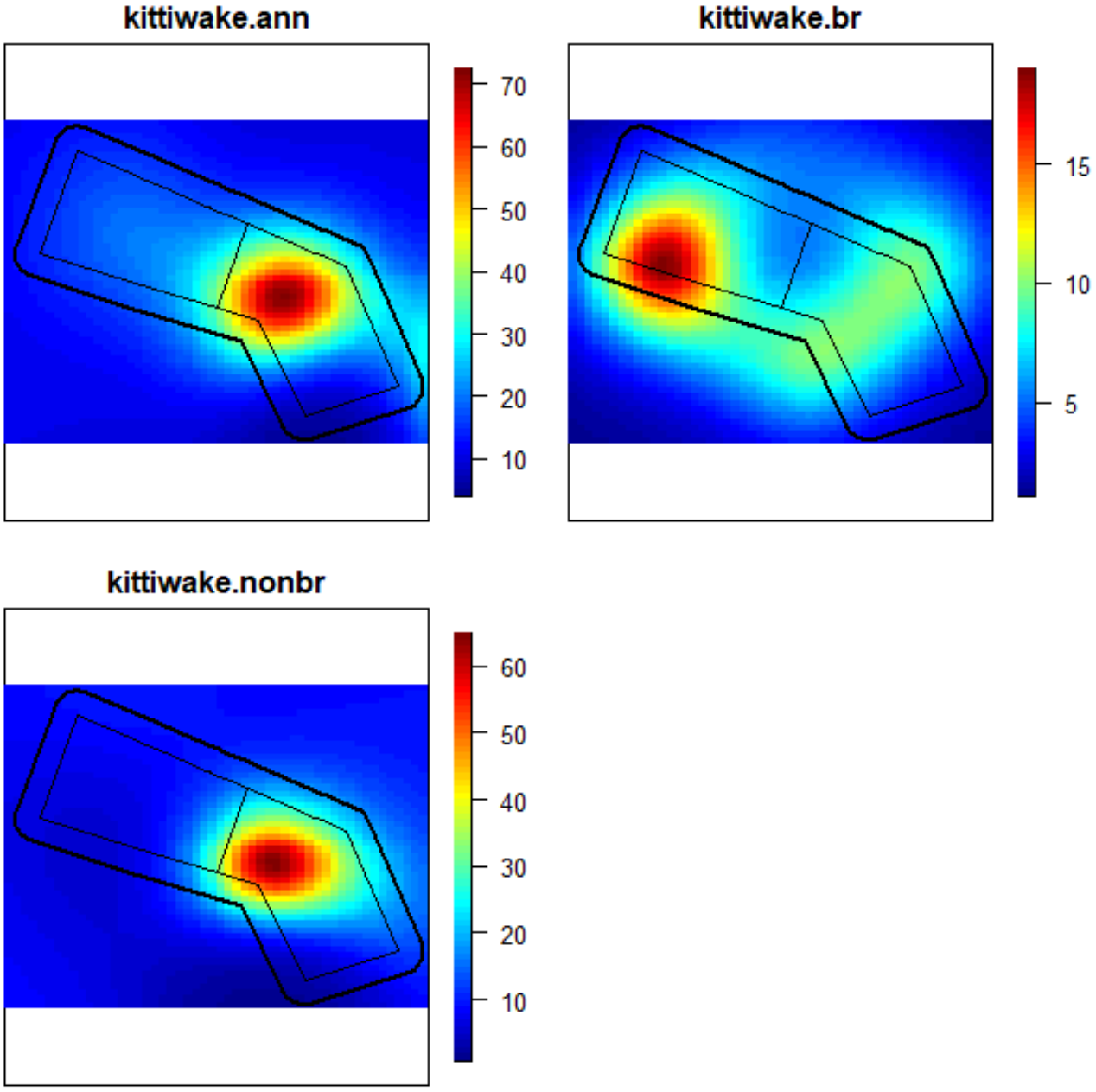

Plate 1-12 Spatial Distribution of Kittiwake Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 1 Survey Data)

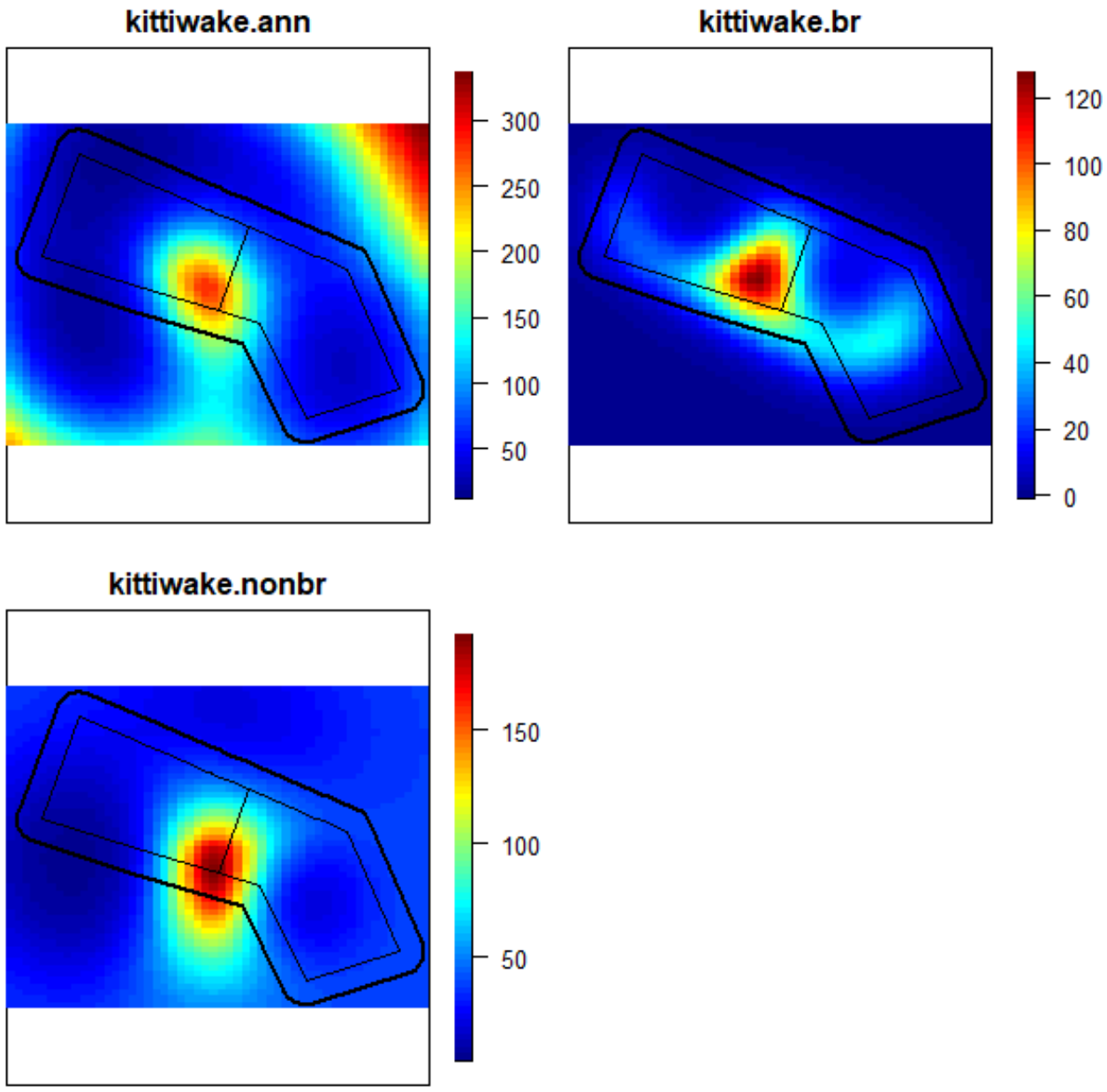

Plate 1-13Spatial Distribution of Kittiwake Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 2 Survey Data)

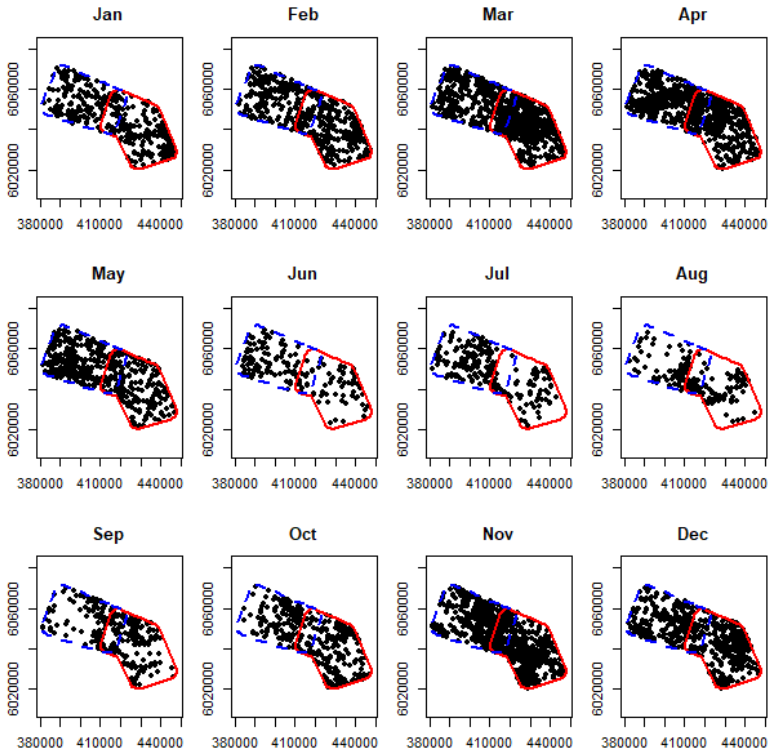

Plate 1-14 Plot of Raw Observations of Kittiwake Across Each Month, Year 1 and Year 2 Survey Data Combined

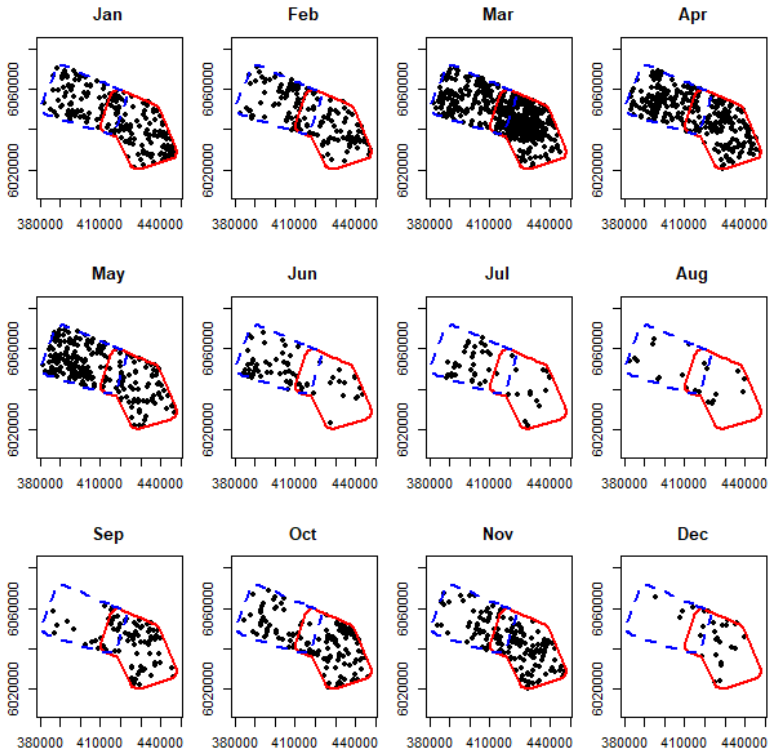

Plate 1-15 Plot of Raw Observations of Kittiwake Across Each Month, Year 1 Survey Data

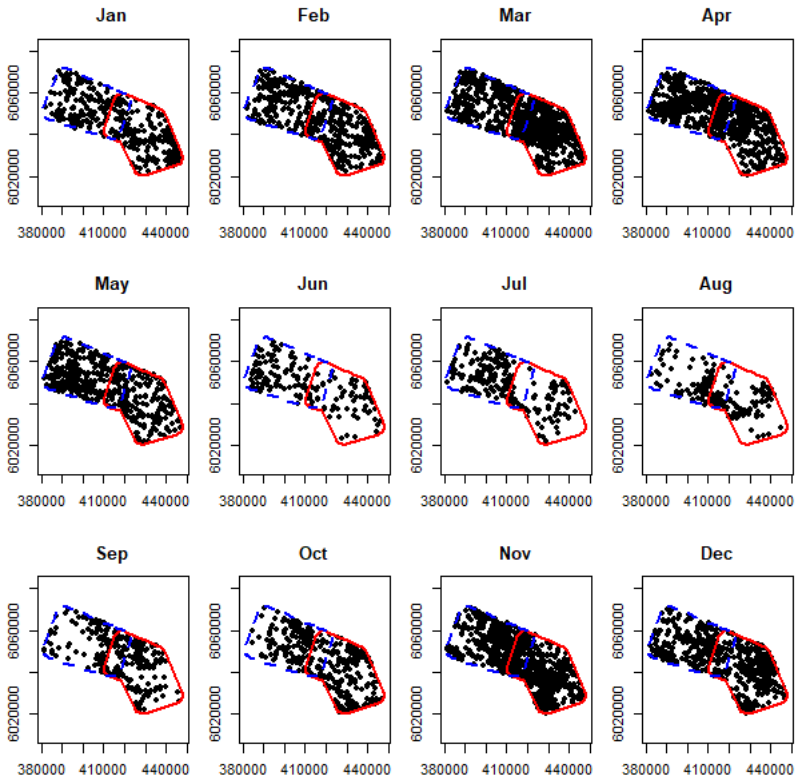

Plate 1-16 Plot of Raw Observations of Kittiwake Across Each Month, Year 2 Survey Data

1.6 Guillemot

21. **Plates 1-17** to **1-19** below detail the spatial plots of guillemot within the TCE Round 4 lease option area assessed at the PEIR stage of the Projects, with the refined Array Areas overlain. These plots are based on the combined Year 1 and Year 2 survey data obtained during the digital aerial surveys undertaken for the Projects. These plots present the abundance of guillemot within the TCE leasing area / Dogger Bank South (DBS) East and DBS West Array Areas annually (**Plate 1-17**), during the breeding season (**Plate 1-18**) and non-breeding season (**Plate 1-19**). The Projects refined Array Areas have been overlain to highlight how the changes were made between PEIR and Application stages.

22. Following Natural England feedback, the Applicants have also included the separate Year 1 survey data (**Plate 1-20**) and Year 2 survey data (**Plate 1-21**).

23. As detailed in **Plates 1-17** to **1-19**, while guillemot were most abundant within the TCE leasing areas in the non-breeding season, the highest density area are located at the previous boundary between the TCE leasing areas.

24. In addition, **Plate 1-22** to **Plate 1-24** below detail the raw observations of guillemot across the TCE leasing areas for each month of the year, based on the combined Year 1 alone, Year 2 alone and Year 1 and Year 2 combined survey data.

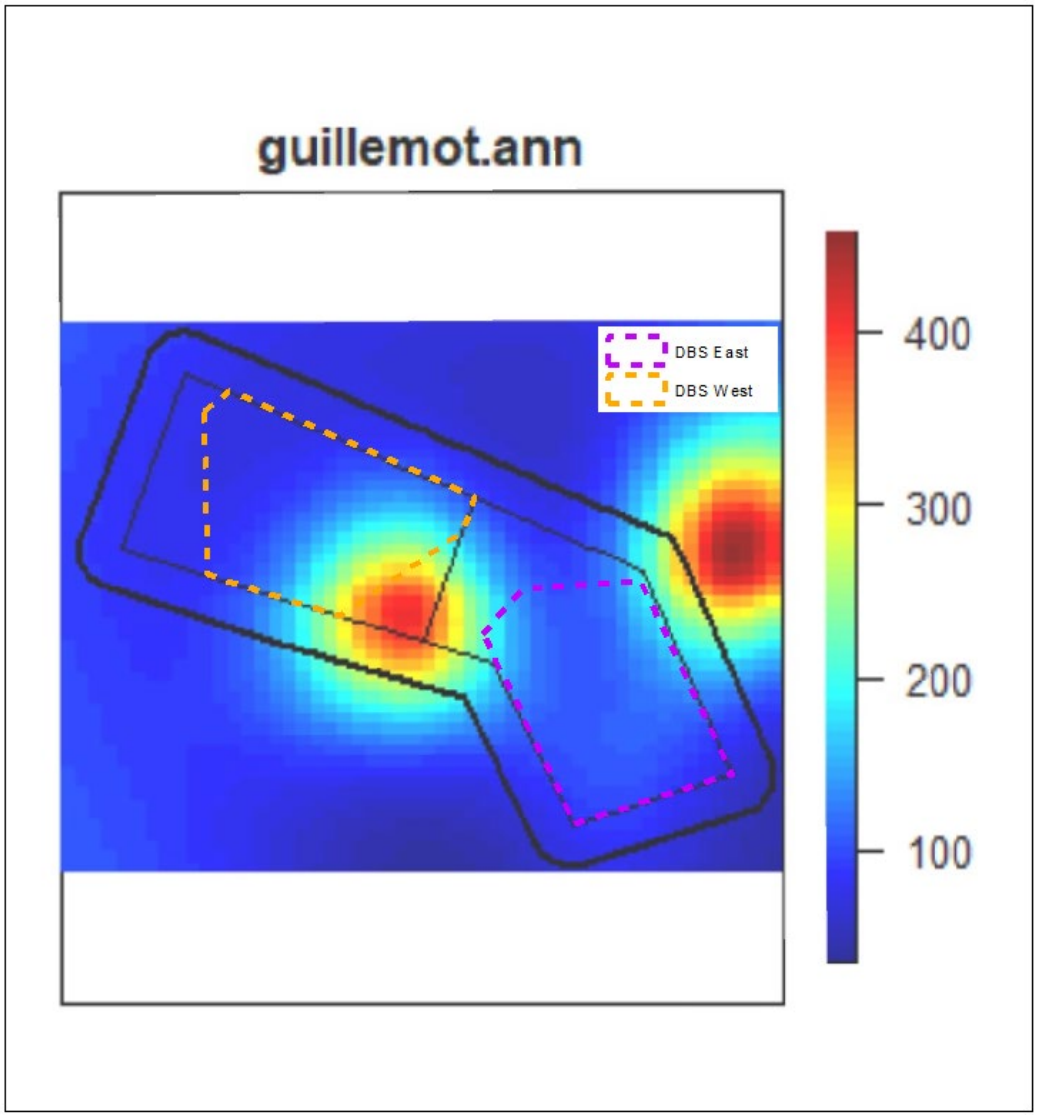

Plate 1-17 Spatial Distribution of Guillemot Annually Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

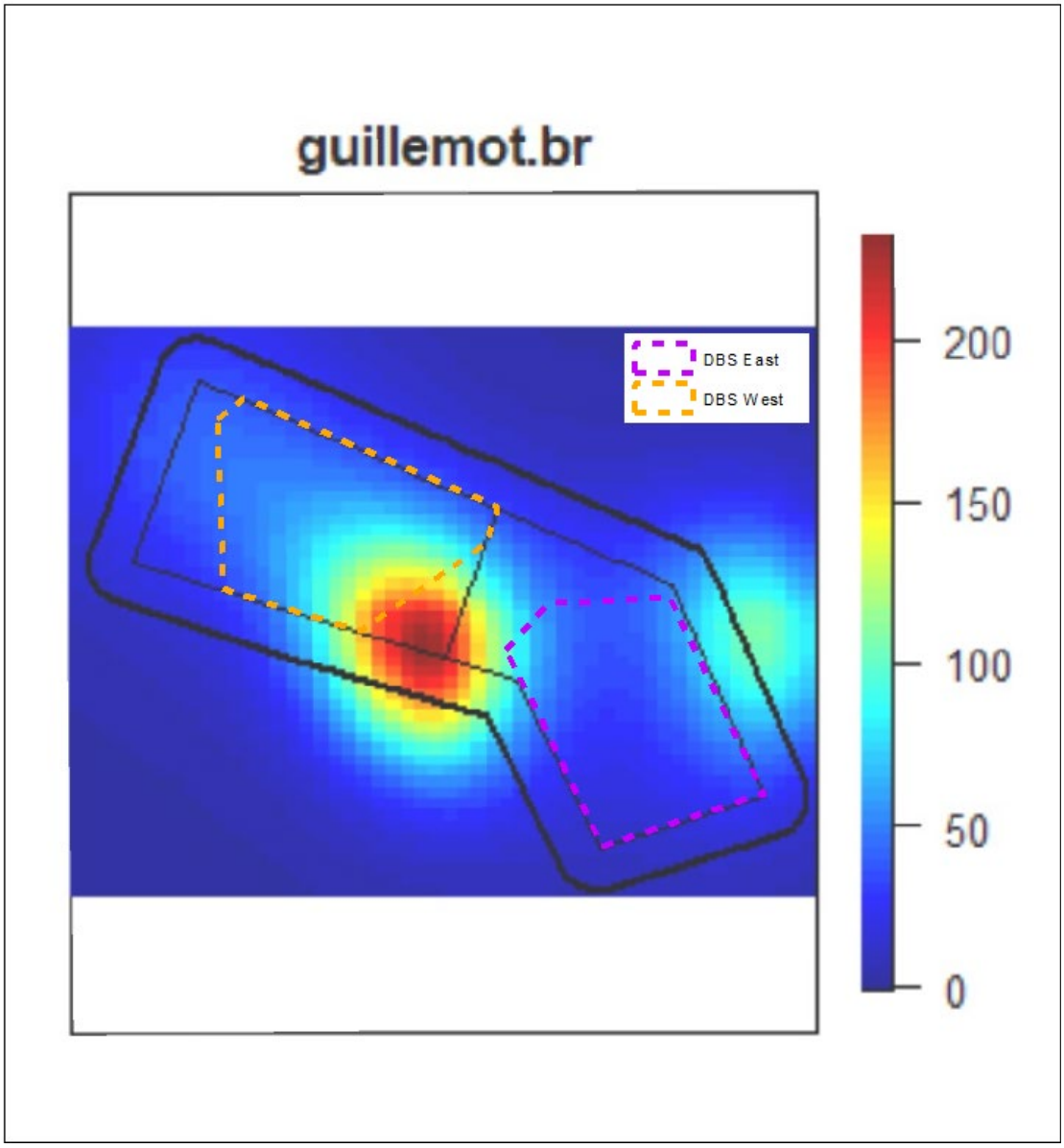

Plate 1-18 Spatial Distribution of Guillemot During Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

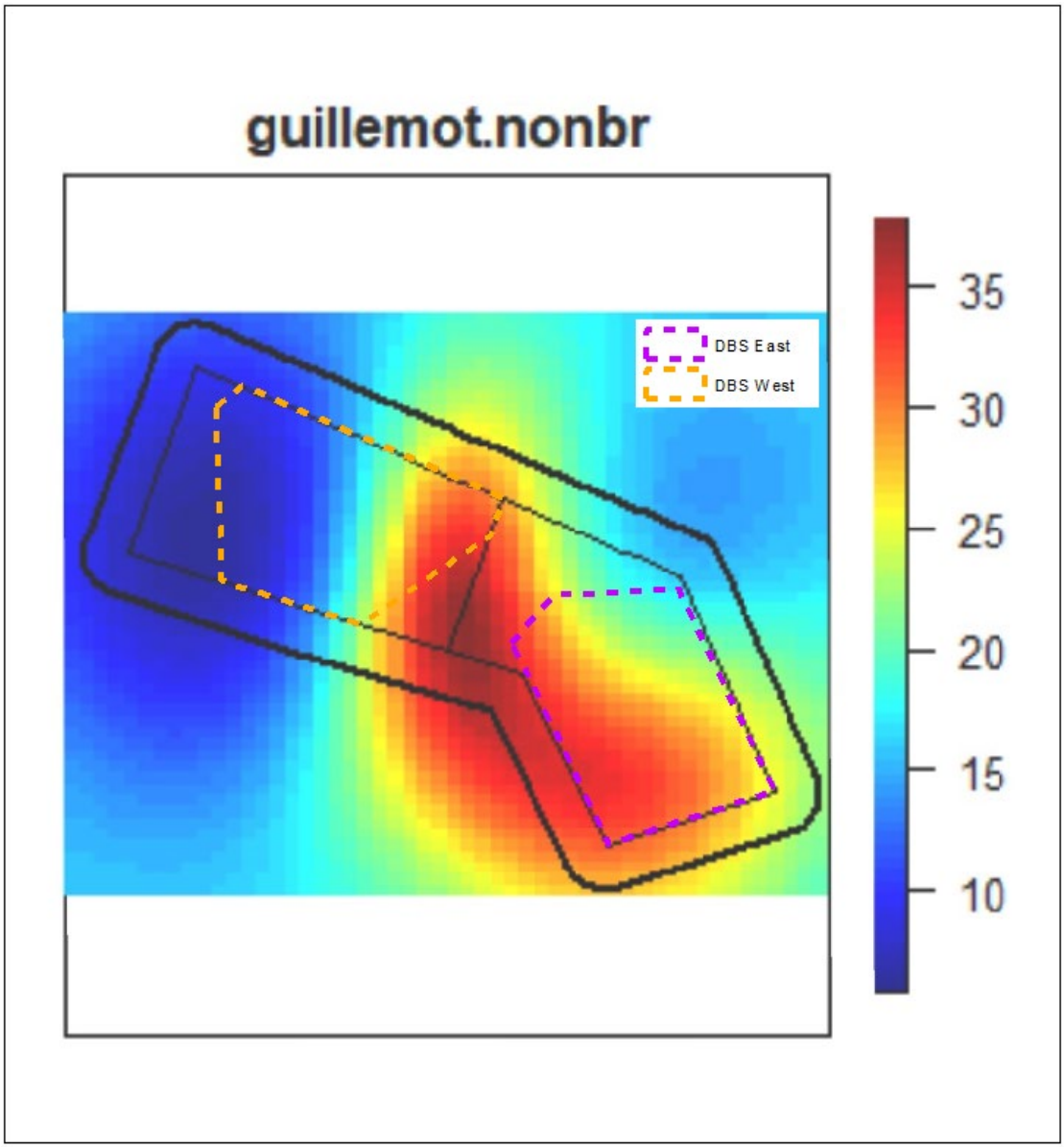

Plate 1-19 Spatial Distribution of Guillemot During Non-Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

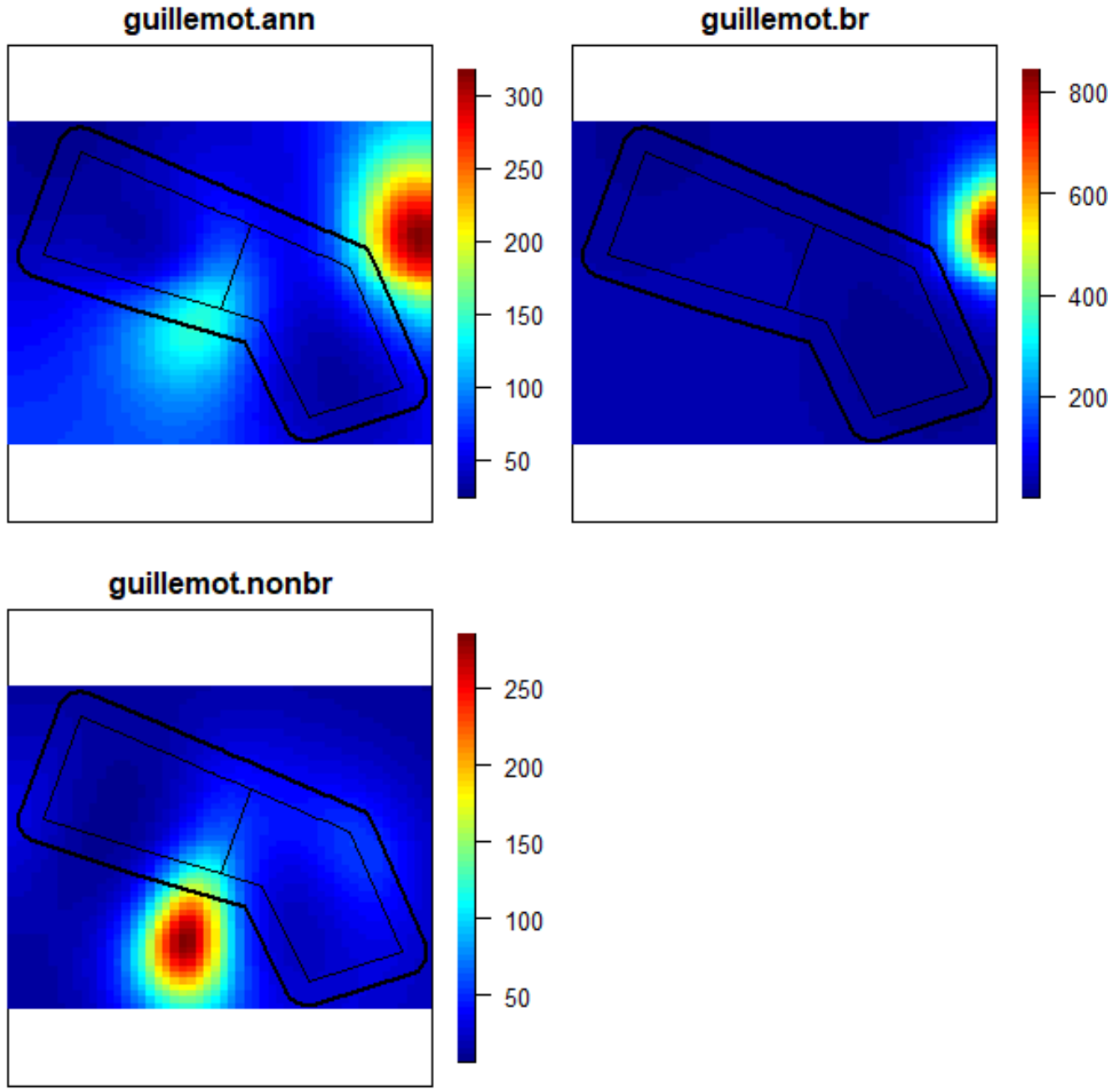

Plate 1-20 Spatial Distribution of Guillemot Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 1 Survey Data)

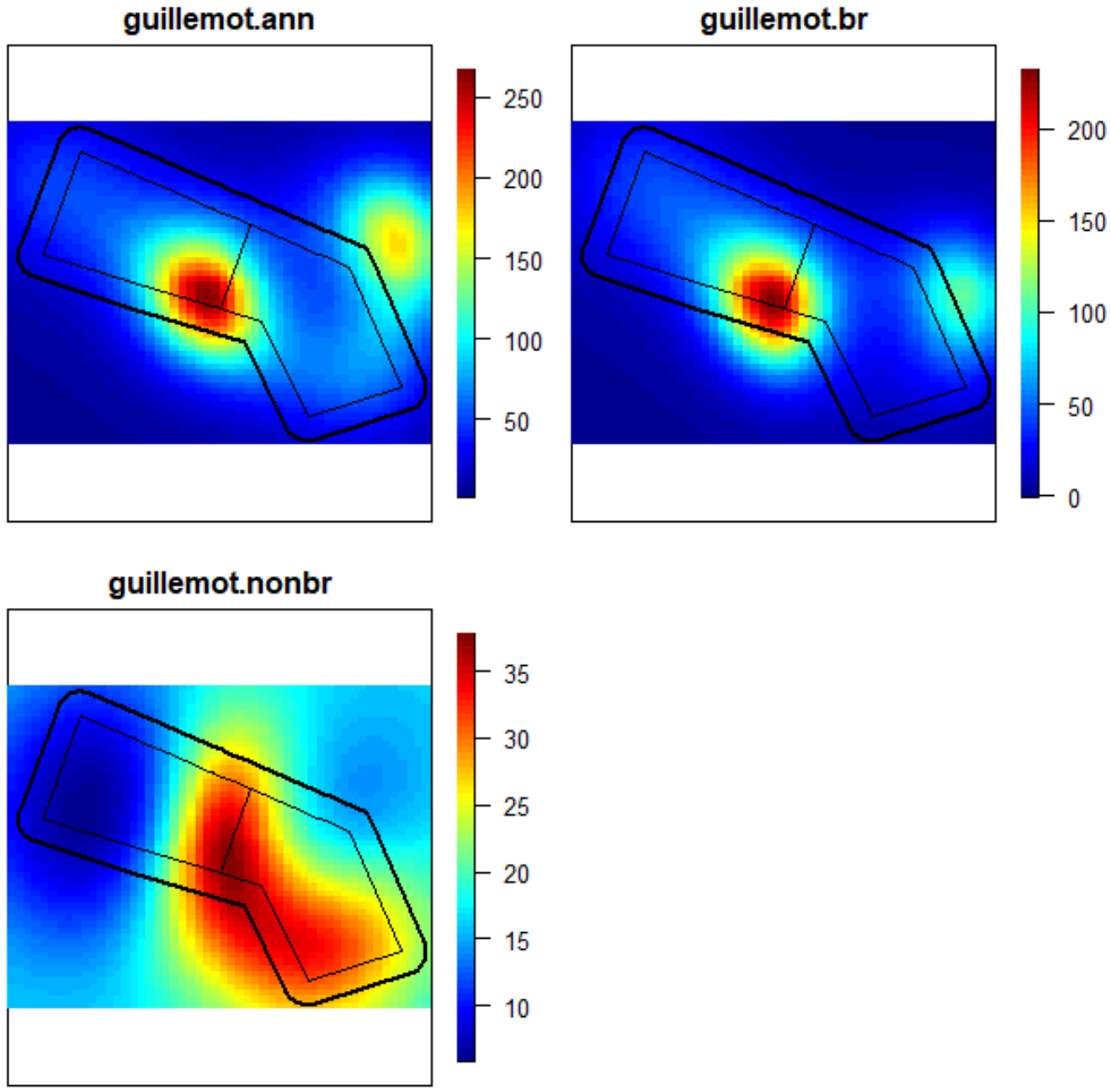

Plate 1-21 Spatial Distribution of Guillemot Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 2 Survey Data)

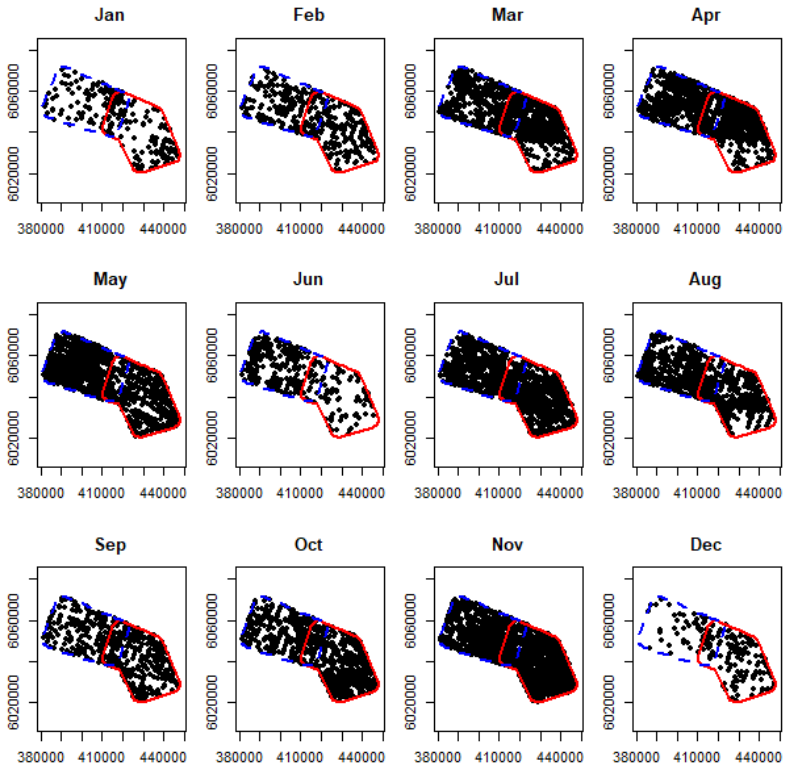

Plate 1-22 Plot of Raw Observations of Guillemot Across Each Month, Year 1 and Year 2 Survey Data Combined

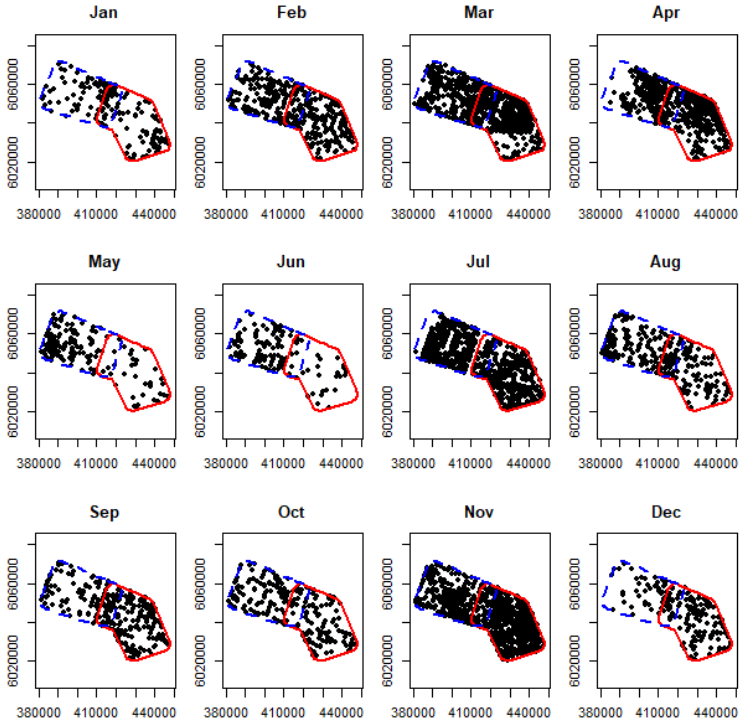

Plate 1-23 Plot of Raw Observations of Guillemot Across Each Month, Year 1 Survey Data

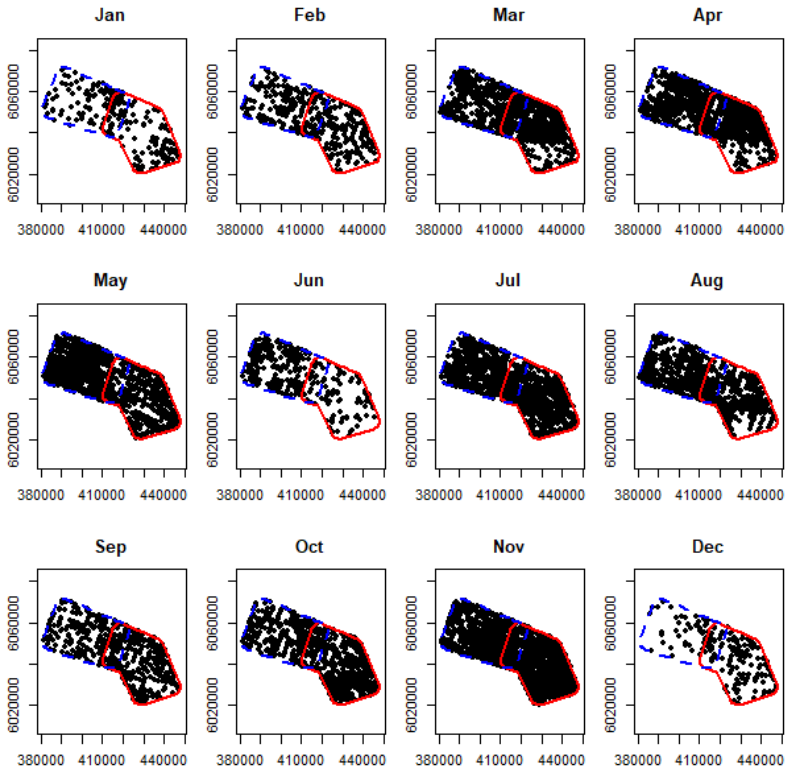

Plate 1-24 Plot of Raw Observations of Guillemot Across Each Month, Year 2 Survey Data

1.7 Razorbill

25. **Plates 1-25** to **1-27** below detail the spatial plots of razorbill within the TCE Round 4 lease option area assessed at the PEIR stage of the Projects, with the refined Array Areas overlain. These plots are based on the combined Year 1 and Year 2 survey data obtained during the digital aerial surveys undertaken for the Projects. These plots present the abundance of razorbill within the TCE leasing area / DBS East and DBS West Array Areas annually (**Plate 1-25**), during the breeding season (**Plate 1-26**) and non-breeding season (**Plate 1-27**). The Projects refined Array Areas have been overlain to highlight how the changes were made between PEIR and Application stages.

26. Following Natural England feedback, the Applicants have also included the separate Year 1 survey data (**Plate 1-28**) and Year 2 survey data (**Plate 1-29**).

27. As detailed in **Plates 1-25** to **1-27**, annually razorbill were most abundant within the south-eastern corner of the previous DBS West Array Area. Abundance within the DBS East Array Area was elevated during the breeding season, but mostly absent for the remainder of the year.

28. In addition, **Plate 1-28** to **Plate 1-30** present the raw observations of razorbill across the TCE leasing areas for each month of the year, for Year 1 alone, Year 2 alone and Year 1 and Year 2 combined survey data.

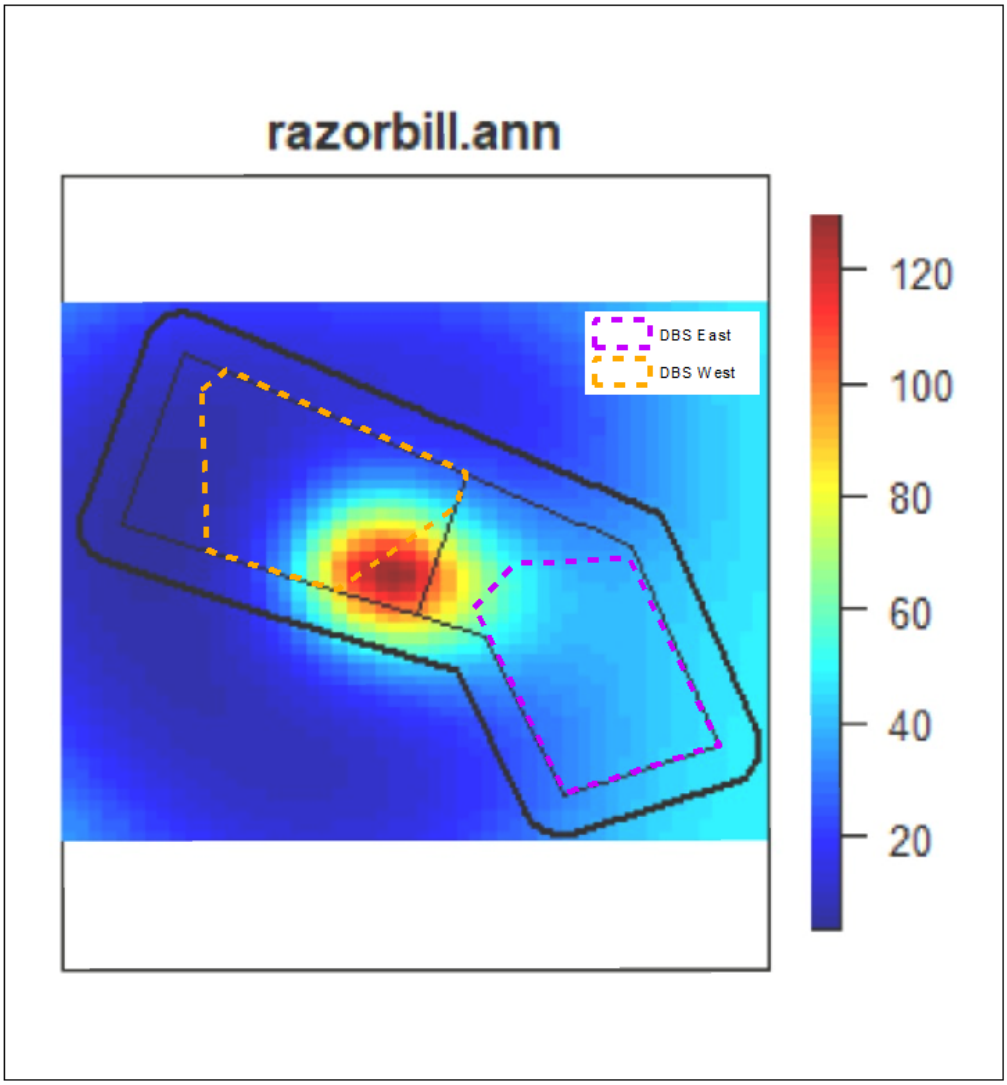

Plate 1-25 Spatial Distribution of Razorbill Annually Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

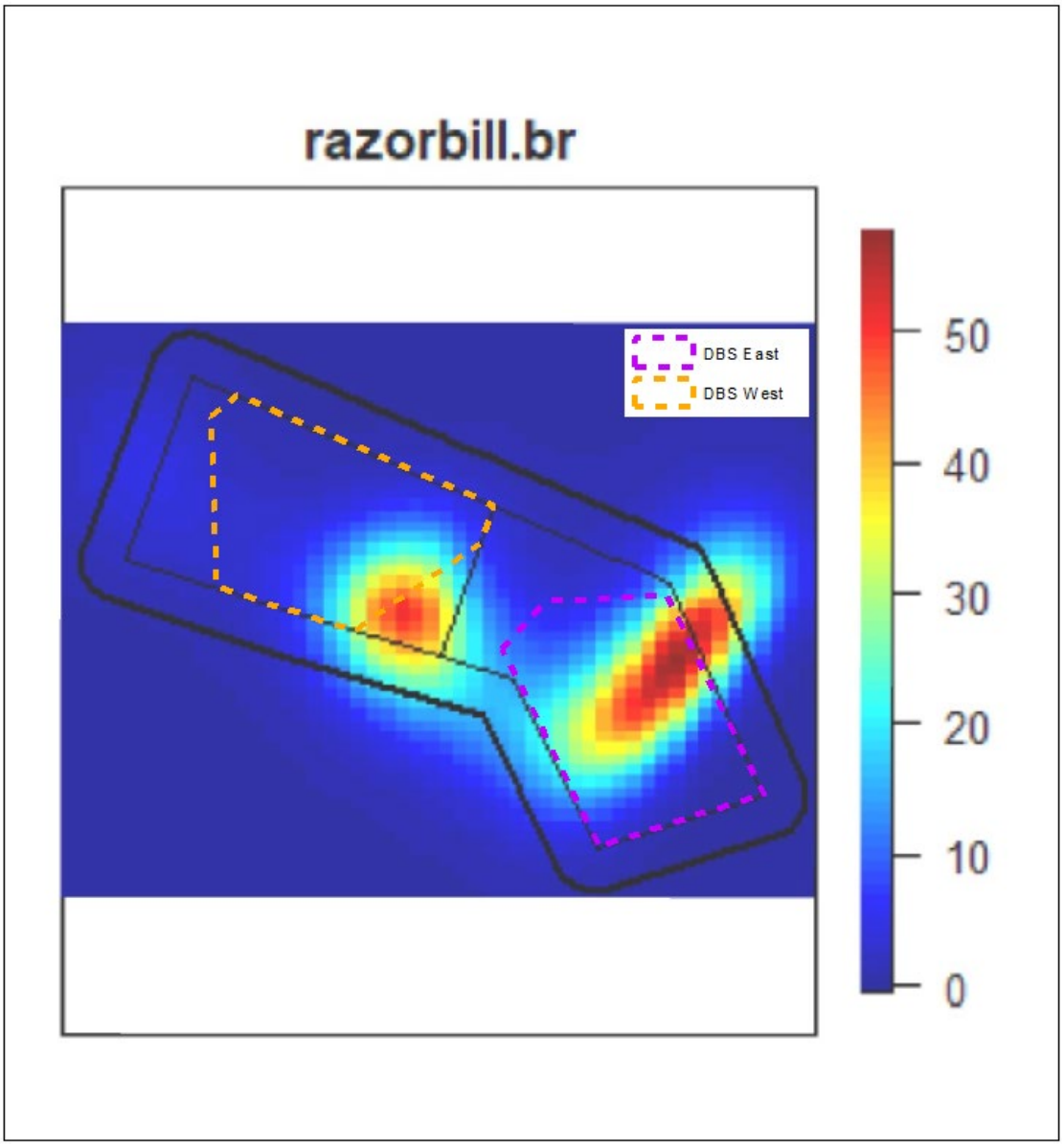

Plate 1-26 Spatial Distribution of Razorbill During Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

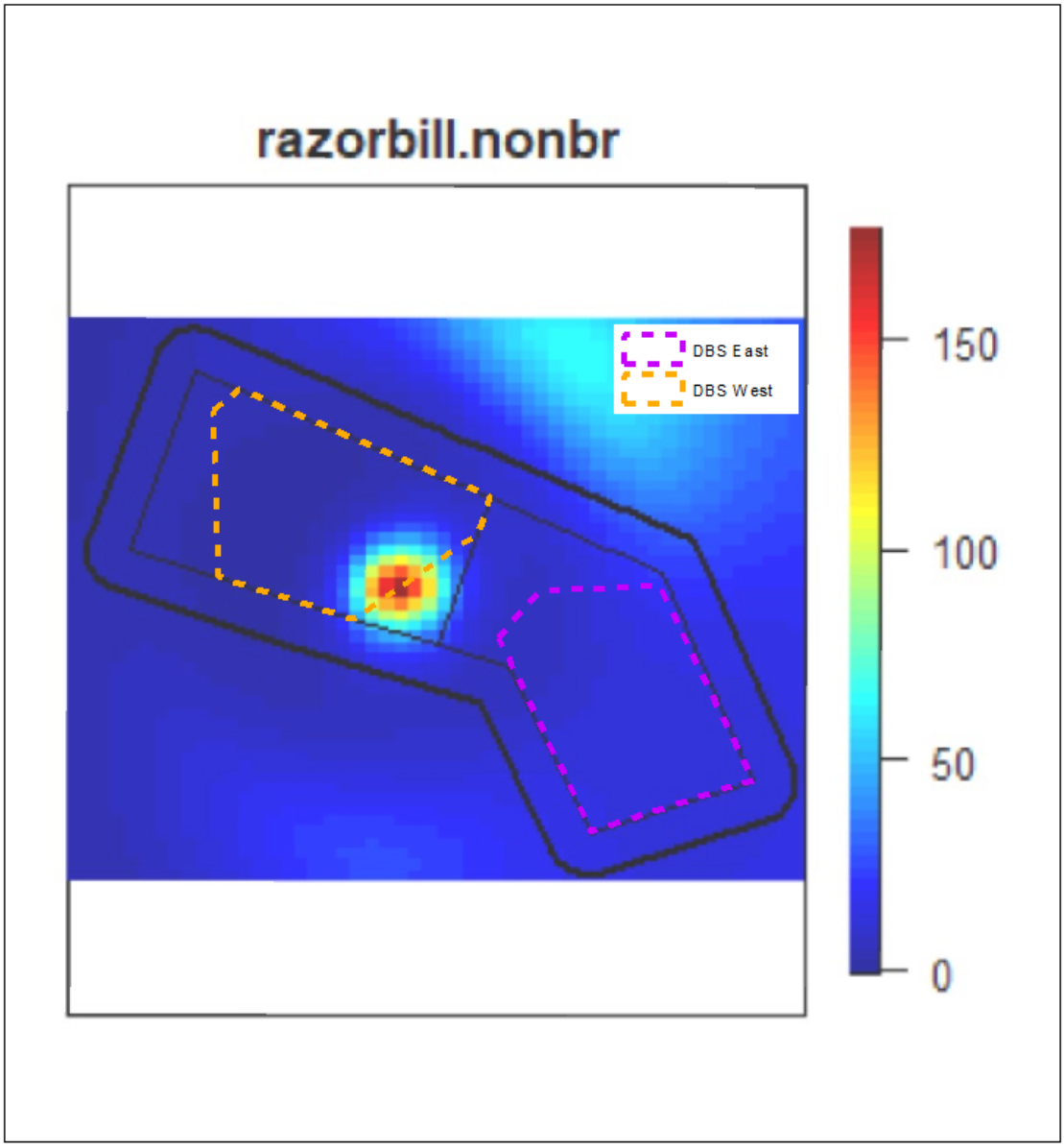

Plate 1-27 Spatial Distribution of Razorbill During Non-Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

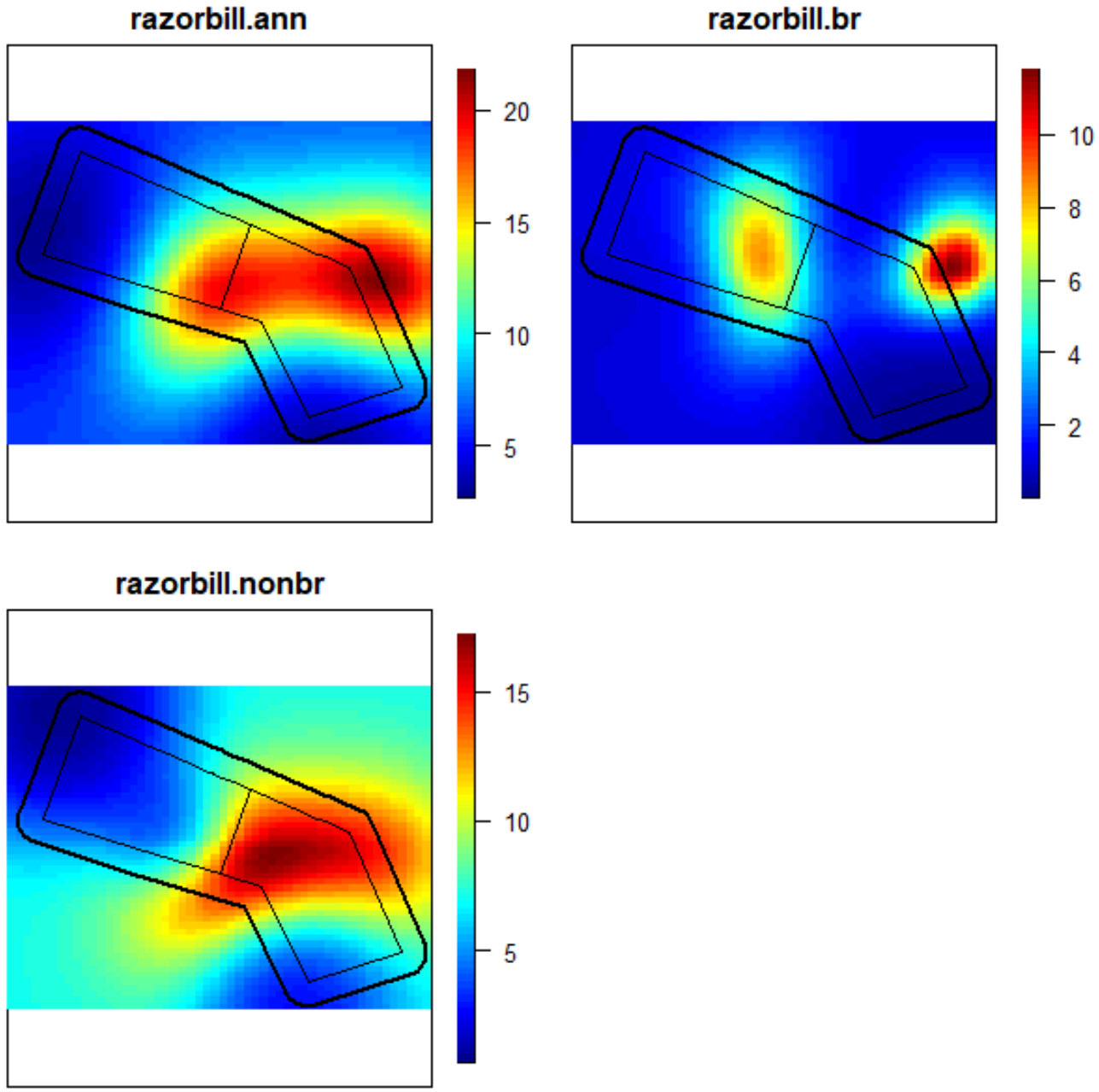

Plate 1-28 Spatial Distribution of Razorbill Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 1 Survey Data)

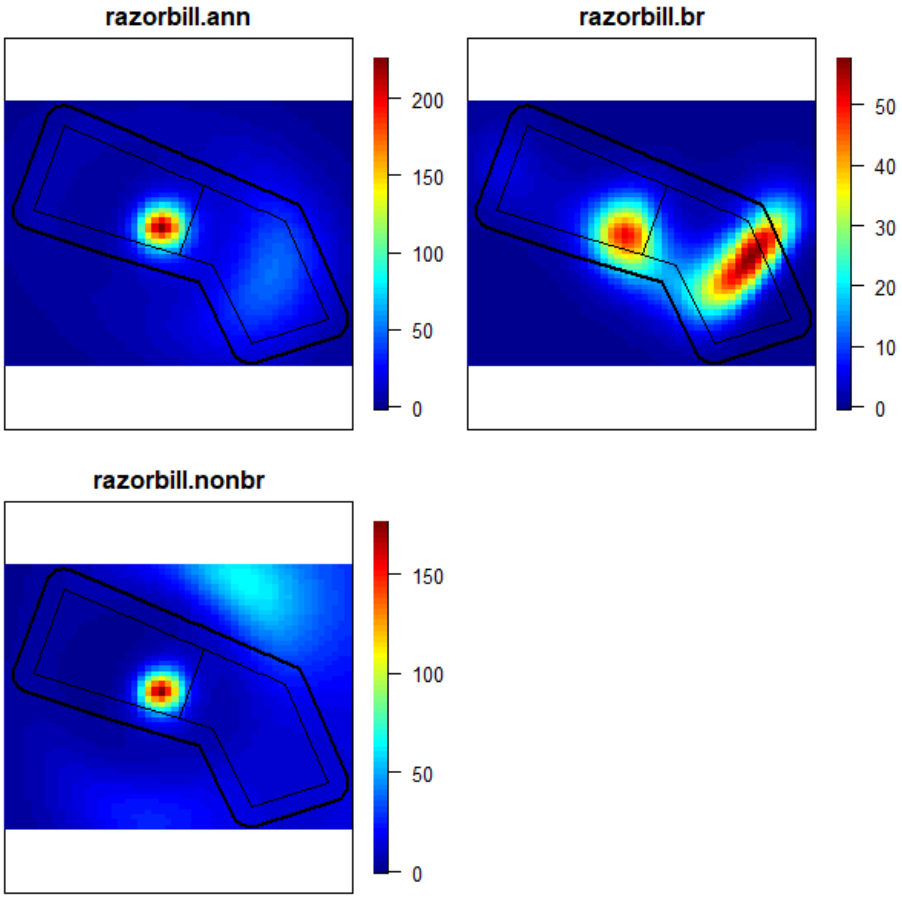

Plate 1-29 Spatial Distribution of Razorbill Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 2 Survey Data)

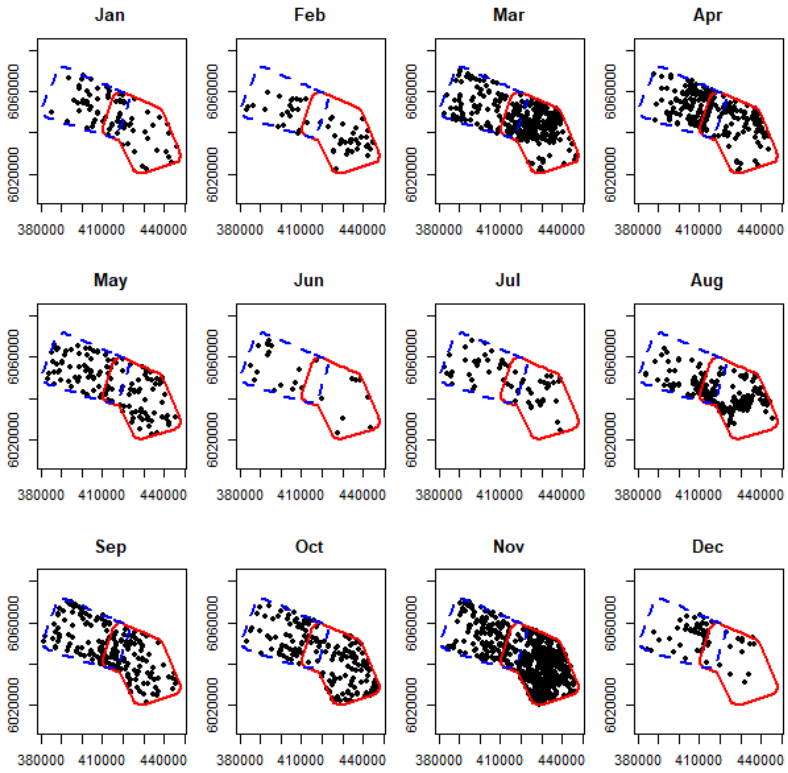

Plate 1-30 Plot of Raw Observations of Razorbill Across Each Month, Year 1 and Year 2 Survey Data Combined

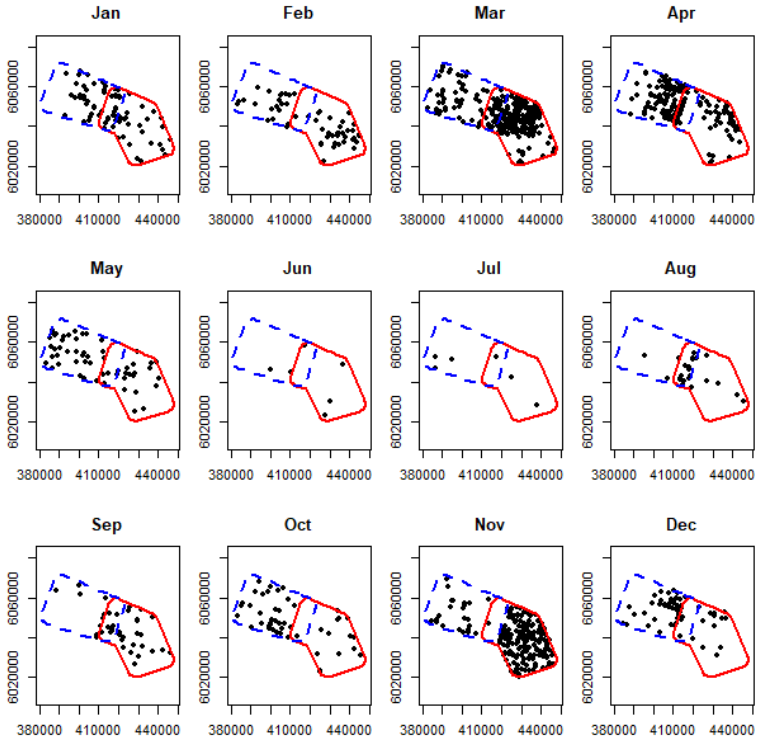

Plate 1-31 Plot of Raw Observations of Razorbill Across Each Month, Year 1 Survey Data

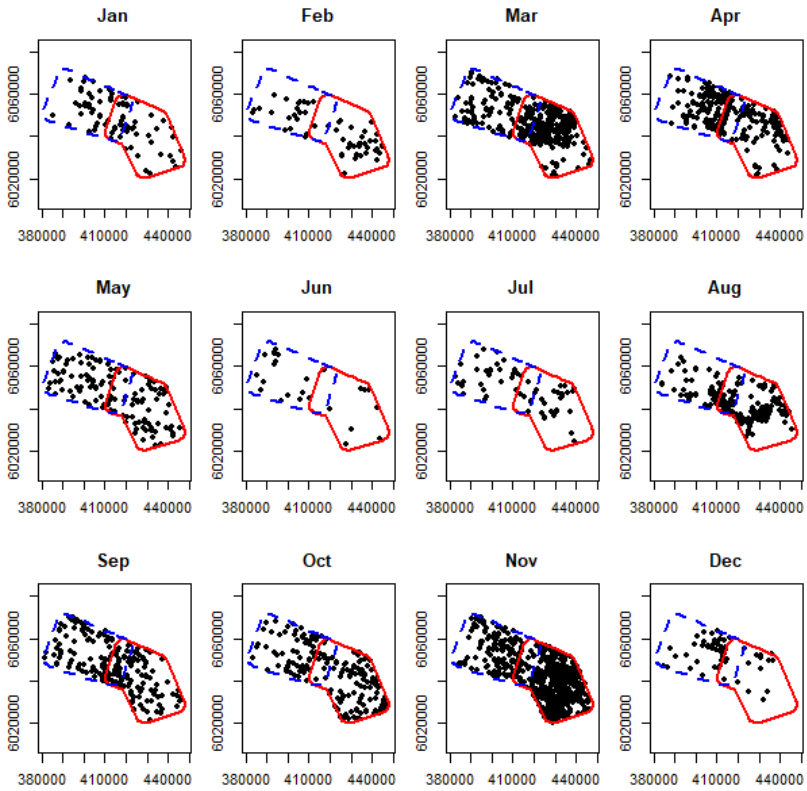

Plate 1-32 Plot of Raw Observations of Razorbill Across Each Month, Year 2 Survey Data

1.8 Puffin

29. **Plates 1-33** to **1-35** below detail the spatial plots of puffin within the TCE Round 4 lease option area assessed at the PEIR stage of the Projects, with the refined Array Areas overlain. These plots are based on the combined Year 1 and Year 2 survey data obtained during the digital aerial surveys undertaken for the Projects. These plots present the abundance of puffin within the TCE leasing area / DBS East and DBS West Array Areas annually (**Plate 1-33**), during the breeding season (**Plate 1-34**) and non-breeding season (**Plate 1-35**). The Projects refined Array Areas have been overlain to highlight how the changes were made between PEIR and Application stages.

30. Following Natural England feedback, the Applicants have also included the separate Year 1 survey data (**Plate 1-36**) and Year 2 survey data (**Plate 1-37**).

31. As detailed in **Plates 1-33** to **1-36**, abundance of puffin was low throughout the year, with the non-breeding season in particular seeing very low abundance. Abundance in the breeding season was reasonably evenly distributed across both Array Areas.

32. In addition, **Plate 1-38** to **Plate 1-40** present the raw observations of puffin across the TCE leasing areas for each month of the year, for Year 1 alone, Year 2 alone and Year 1 and Year 2 combined survey data.

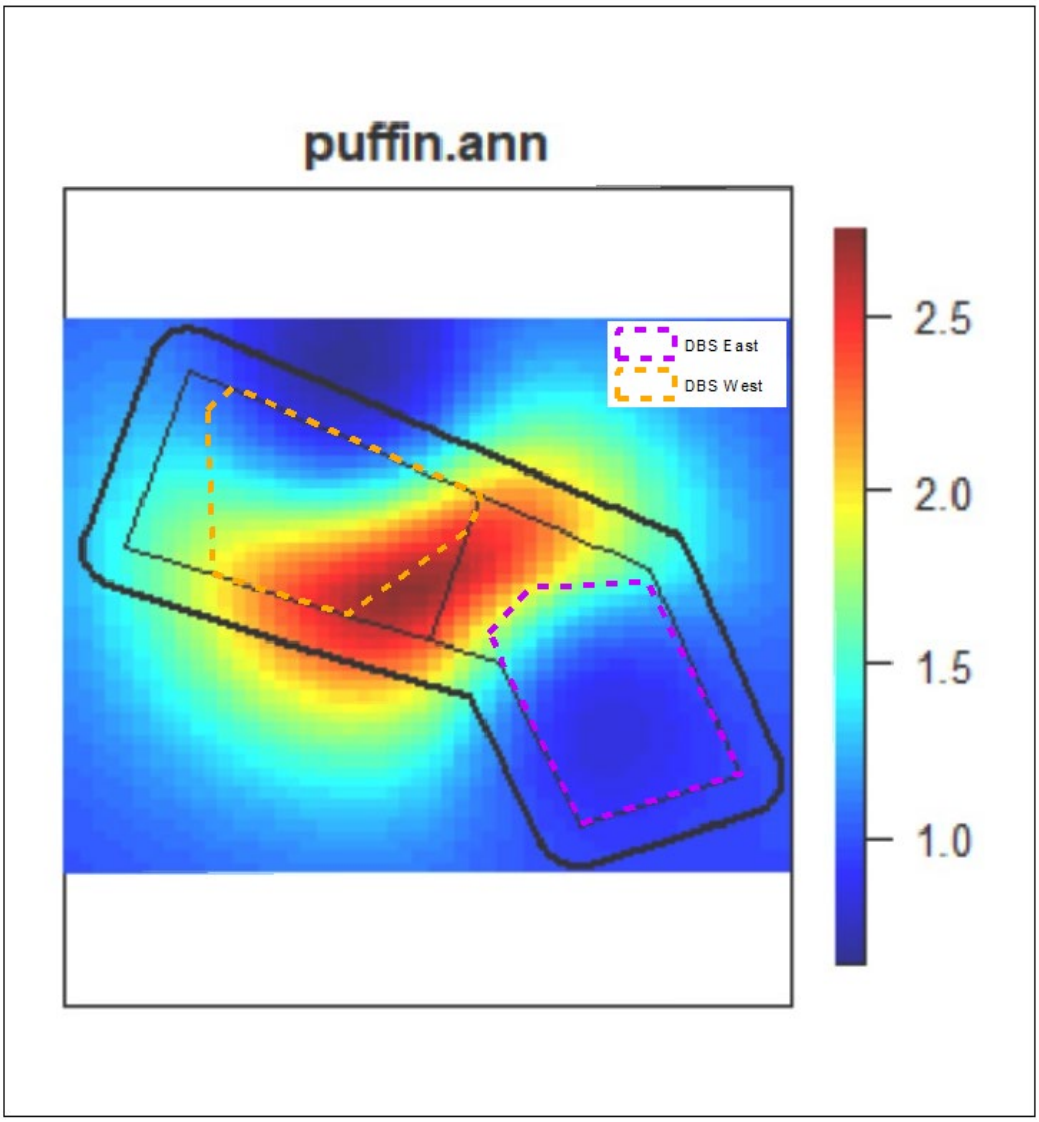

Plate 1-33 Spatial Distribution of Puffin Annually Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

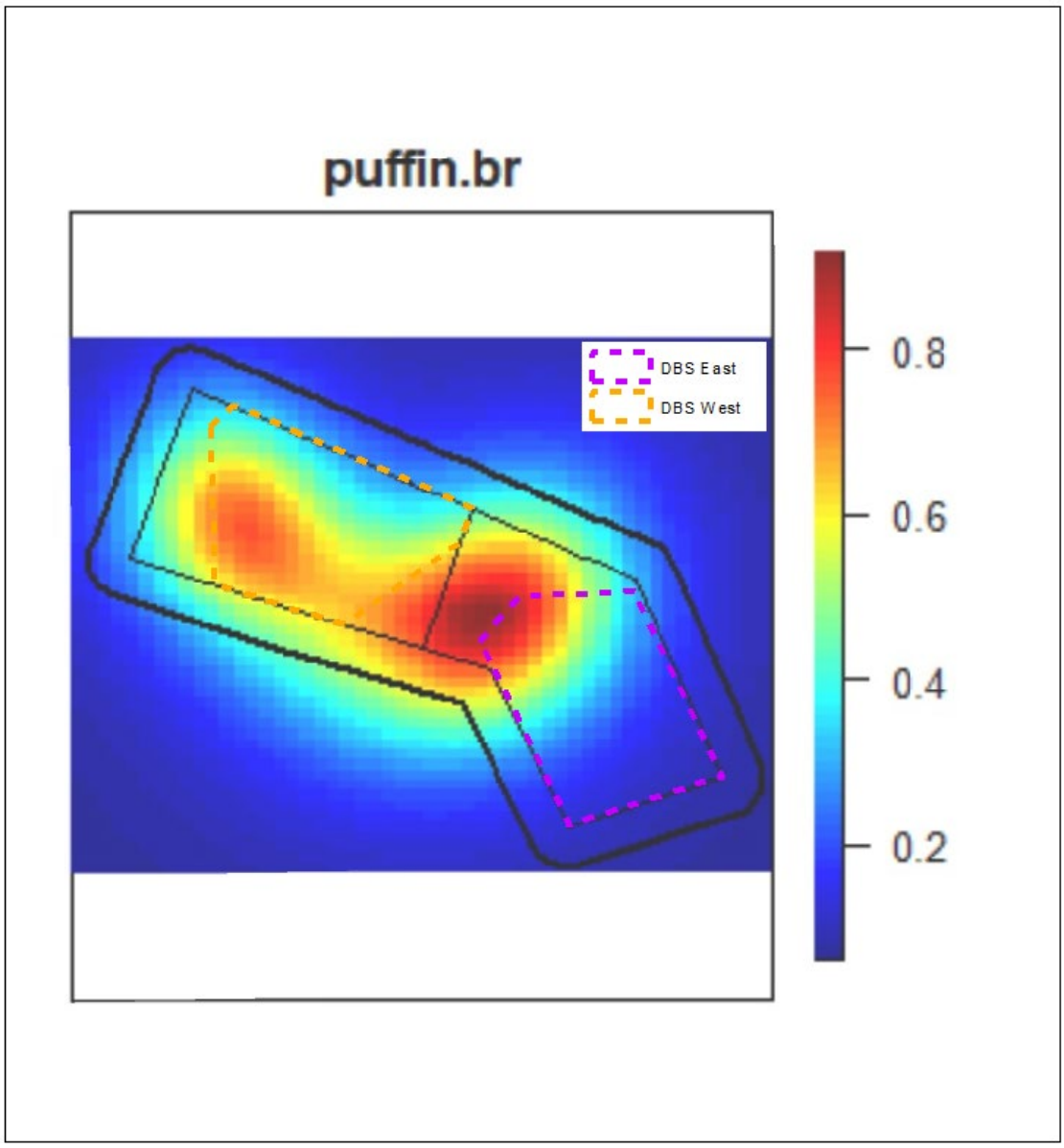

Plate 1-34 Spatial Distribution of Puffin During Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

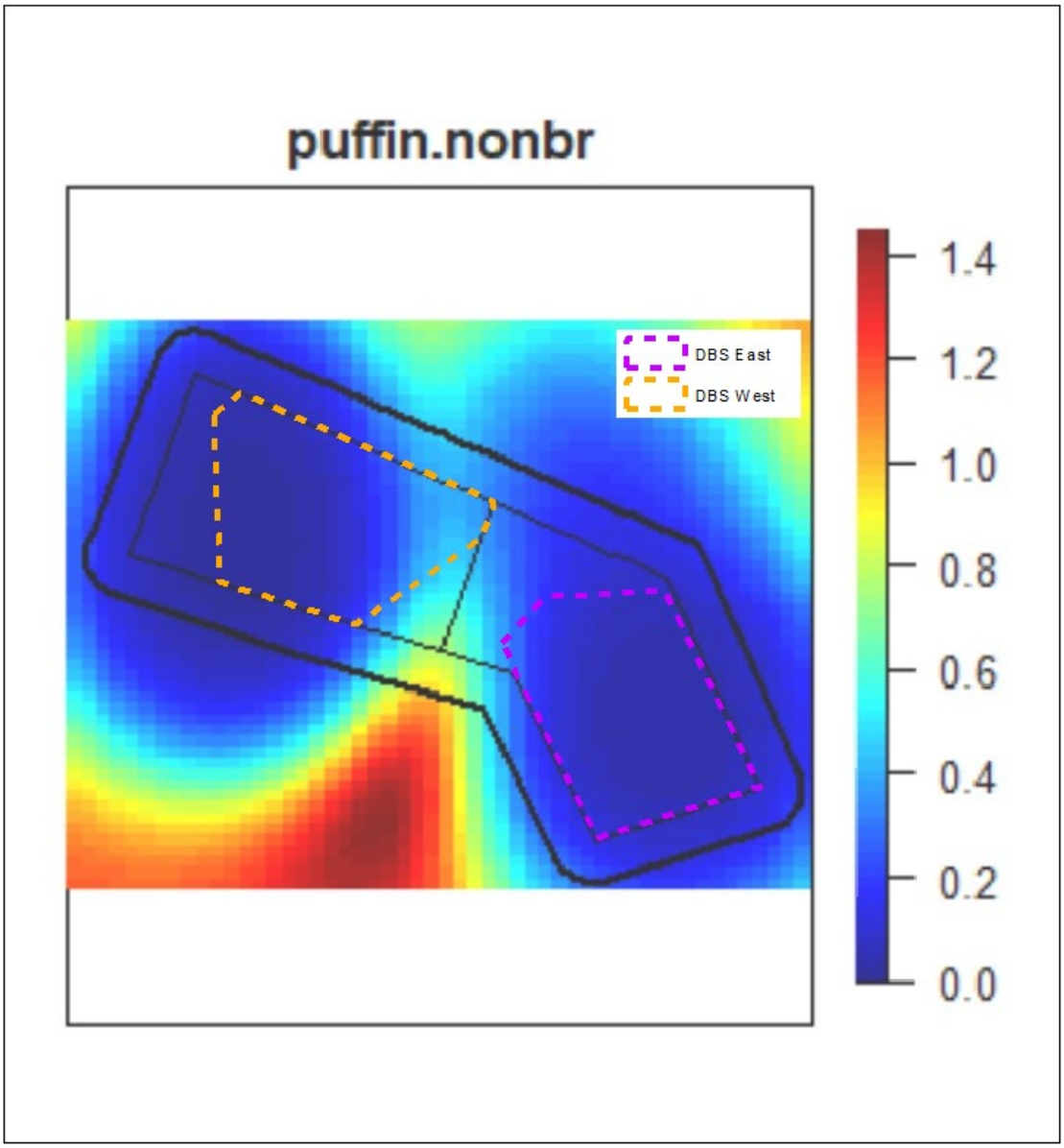

Plate 1-35 Spatial Distribution of Puffin During Non-Breeding Season Within the Projects TCE Leasing Area / Array Areas (Year 1 and Year 2 survey data combined)

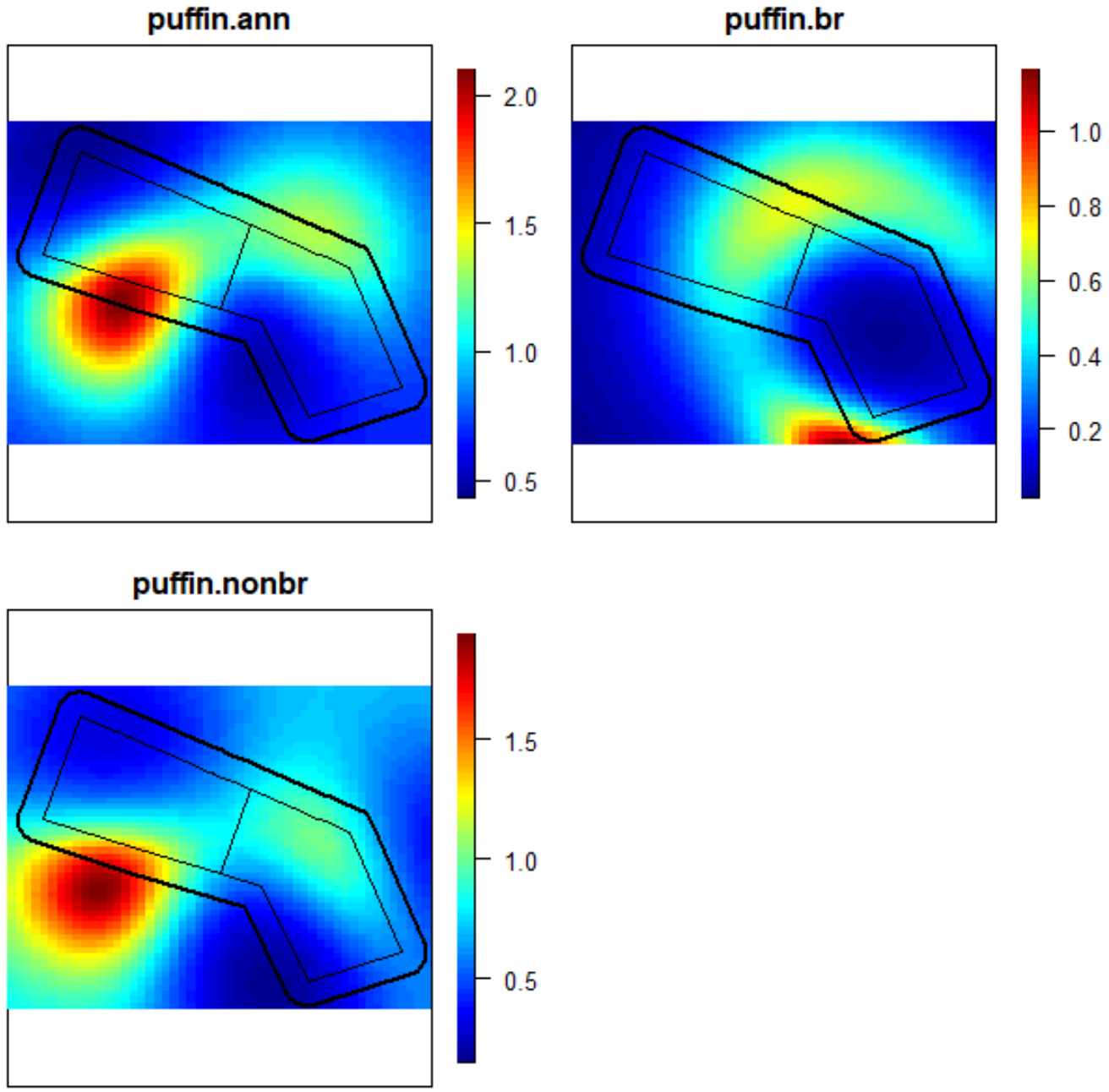

Plate 1-36 Spatial Distribution of Puffin Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 1 Survey Data)

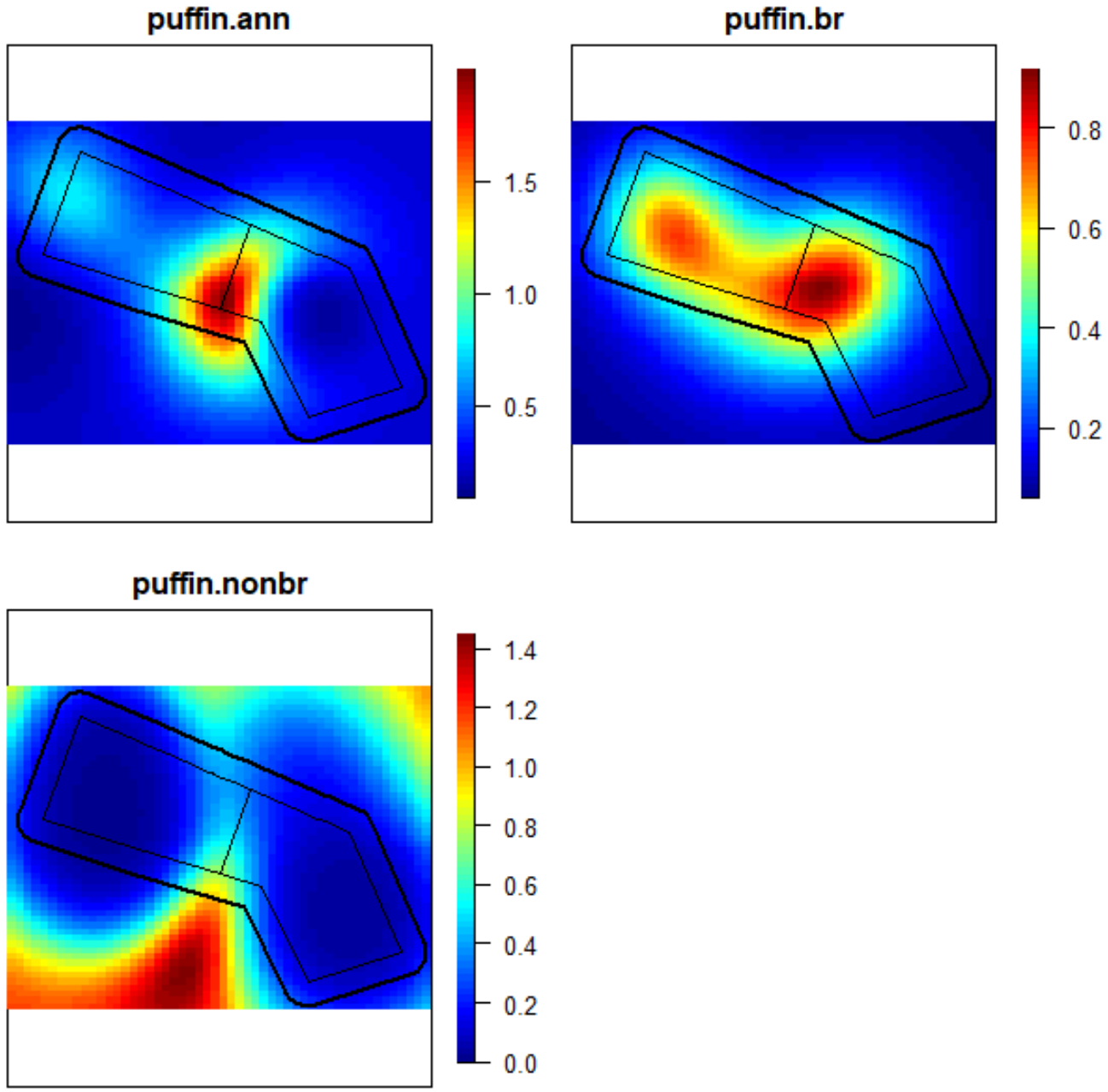

Plate 1-37 Spatial Distribution of Puffin Annually Within the Projects TCE Leasing Area Annually, During Breeding Season and Non-Breeding Season (Year 2 Survey Data)

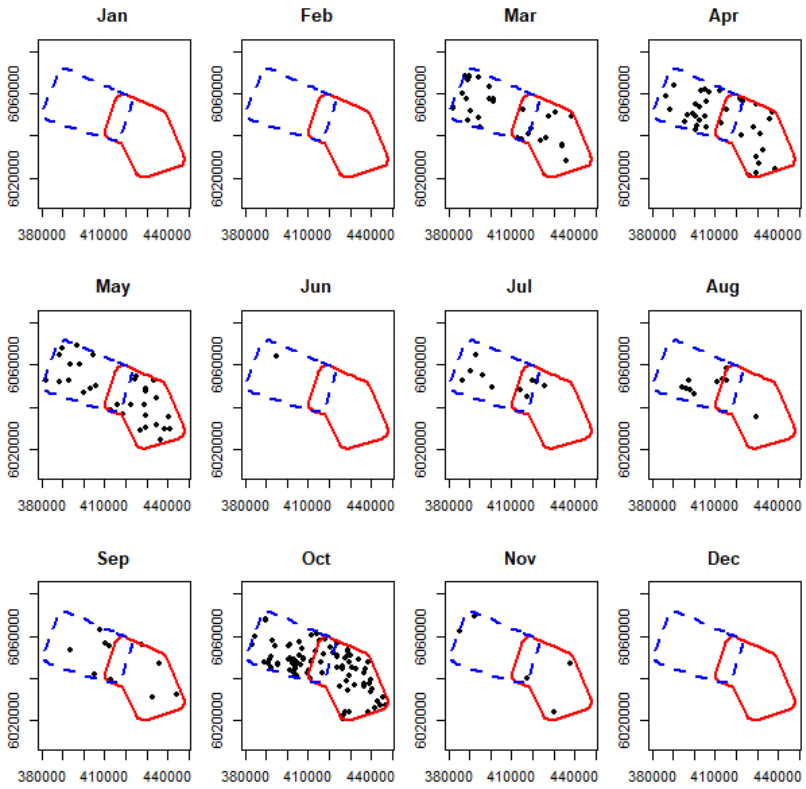

Plate 1-38 Plot of Raw Observations of Puffin Across Each Month, Year 1 and 2 Survey Data Combined

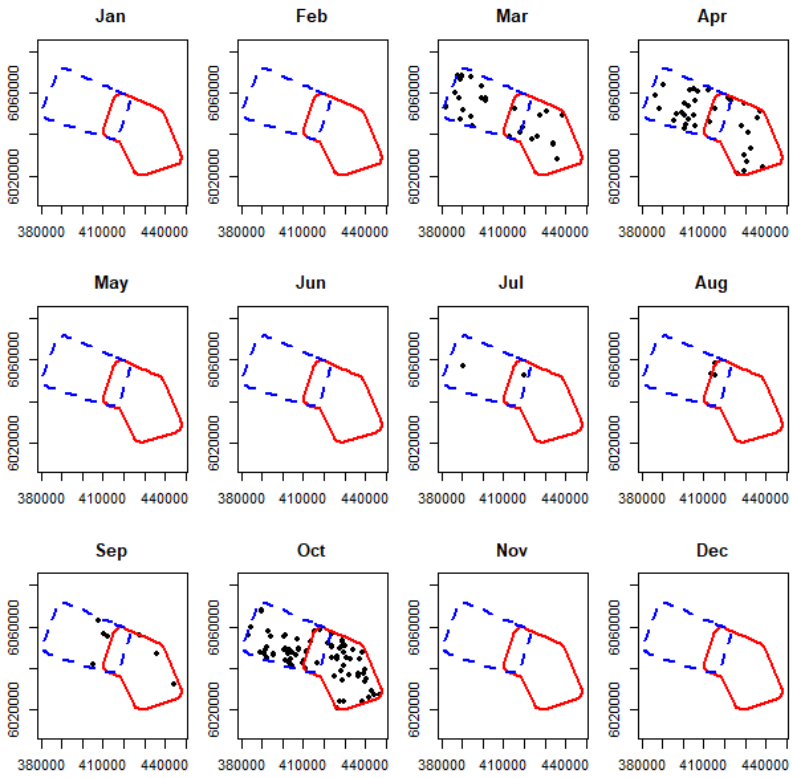

Plate 1-39 Plot of Raw Observations of Puffin Across Each Month, Year 1 Survey Data

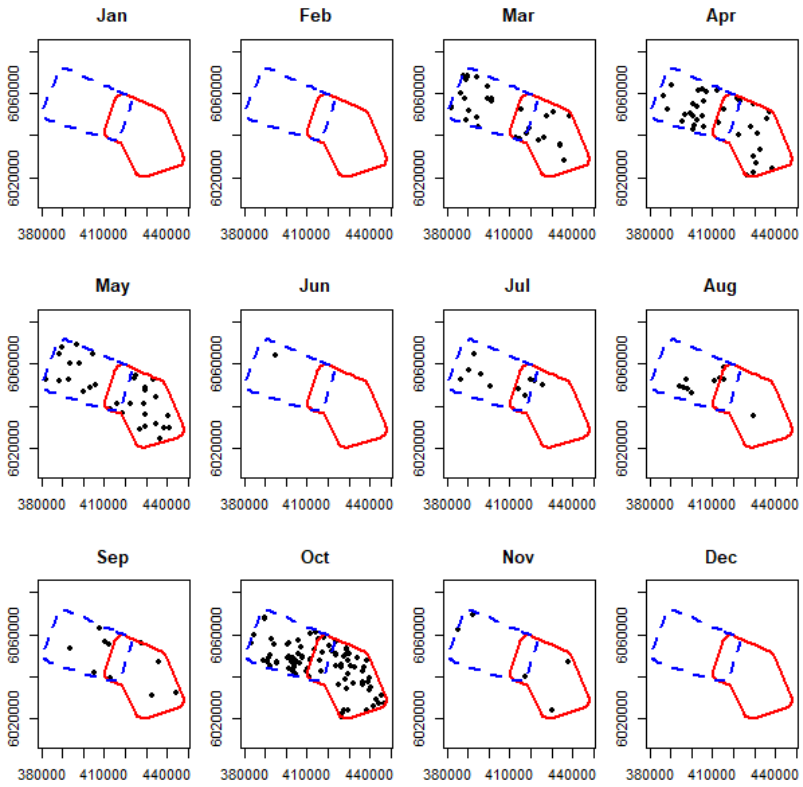

Plate 1-40 Plot of Raw Observations of Puffin Across Each Month, Year 2 Survey Data

1.9 Conclusion

33. In conclusion, this report supports that at the pre-application stage of the Projects, the Applicants reviewed the abundance estimates for the key species of concern with regards to Offshore Ornithology to determine if the Array Areas for DBS East and DBS West could be refined to avoid any potential 'hotspots' where the presence of ornithological species was potentially elevated. As detailed in the Plates presented in this Appendix, when considered annually the abundance of most species was reasonably evenly distributed across each Array Area.

34. There were instances however where higher densities were noted at the previous boundary between the TCE leasing areas, for example with gannet and kittiwake in the non-breeding season (**Plate 1-3** and **Plate 1-11**). This data was then used to support the refinement of the Array Areas that took place following the submission of the Projects Preliminary Environmental Information Report (PEIR) and prior to the submission of the Environmental Statement (ES) (see section 4.7.1 of **Chapter 4 - Site Selection and Assessment of Alternatives (Revision 3)** [document reference 7.4] for further information). Following this refinement, the DBS East and DBS West Array Areas no longer overlap with these areas of higher abundance estimates, as shown in the Plates presented in this Appendix.

35. The Applicants consider that the detail presented in this report sufficiently demonstrates that all reasonable steps have been taken to avoid potential areas of high abundance for ornithological receptors, and that additional survey work would **not** provide any material evidence for which to inform any further refinement of the Projects Array Areas.

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