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Volume 7B Proposed Development (Offshore) Appendices

Appendix 6-1 Offshore Ornithology Baseline Characterisation Report Annex 12 Spatial
Distribution Figures (Caledonia OWF)

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Volume 7B Appendix 6-1 Annex 12 Spatial Distribution Figures (Caledonia OWF)

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Acronyms and Abbreviations

OWF	Offshore Wind Farm
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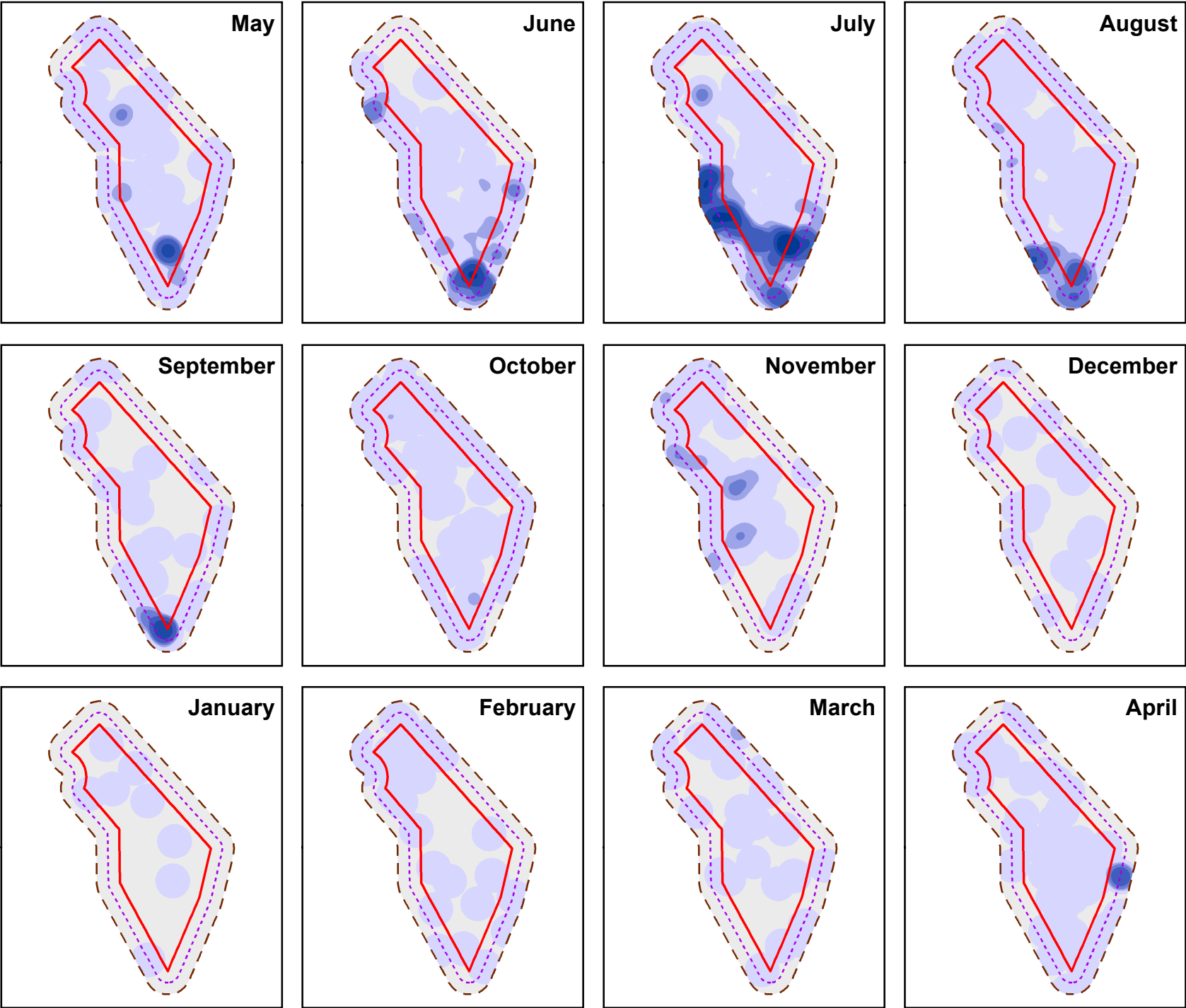
1 Spatial Distribution Figures

1.1 Introduction

- 1.1.1.1 This annex presents spatial distribution maps, generated using design-based estimates, throughout the Caledonia Offshore Wind Farm (OWF) (including Caledonia North and Caledonia South) and relevant buffers (2km and 4km).
- 1.1.1.2 Spatial distribution maps have been generated for the following species:
- Kittiwake, *Rissa tridactyla*;
 - Great black-backed gull, *Larus marinus*;
 - Herring gull, *Larus argentatus*;
 - Lesser black-backed gull, *Larus fuscus*;
 - Guillemot, *Uria aalge*;
 - Razorbill, *Alca torda*;
 - Fulmar, *Fulmarus glacialis*;
 - Gannet, *Morus bassanus*;
 - Puffin, *Fratercula arctica*;
 - Common tern, *Sterna hirundo*;
 - Arctic tern, *Stercorarius parasiticus*;
 - Great skua, *Stercorarius skua*; and
 - Red-throated diver, *Gavia stellata*.
- 1.1.1.3 For the purposes of this report, the spatial distribution of seabirds within the Caledonia OWF (including Caledonia North and Caledonia South) are presented in the form of heatmaps. The heatmaps present data on a monthly basis in order to account for species-specific spatial and temporal distributions for the purposes of defining the Caledonia OWF ornithological baseline.
- 1.1.1.4 To create the heatmaps, point shapefiles were loaded into QGIS and the heatmap plugin for QGIS was installed. The shapefiles were then inputted to the heatmap plugin and a kernel radius of 3km was selected, which was determined to provide the most appropriate smoothing between the data points leaving no gaps in the model outputs. The output raster pixel size was set to 30m. All other default settings within the QGIS heatmap plugin were accepted. The heatmap plugin for each species was then run to generate GeoTIFF heatmaps.
- 1.1.1.5 For further information see Volume 7B, Appendix 6-1: Offshore Ornithology Baseline Characterisation Report.

1.2 Kittiwake

- 1.2.1.1 Spatial distribution maps, generated using design-based estimates, for kittiwake throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-1 and Figure 1-2, respectively.



Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Kittiwake Relative Density

0

0 - 5

5 - 10

10 - 20

20 - 50

50 - 100

100 - 220

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Figure 1-1: Distribution of kittiwake between
May 2021 and April 2022

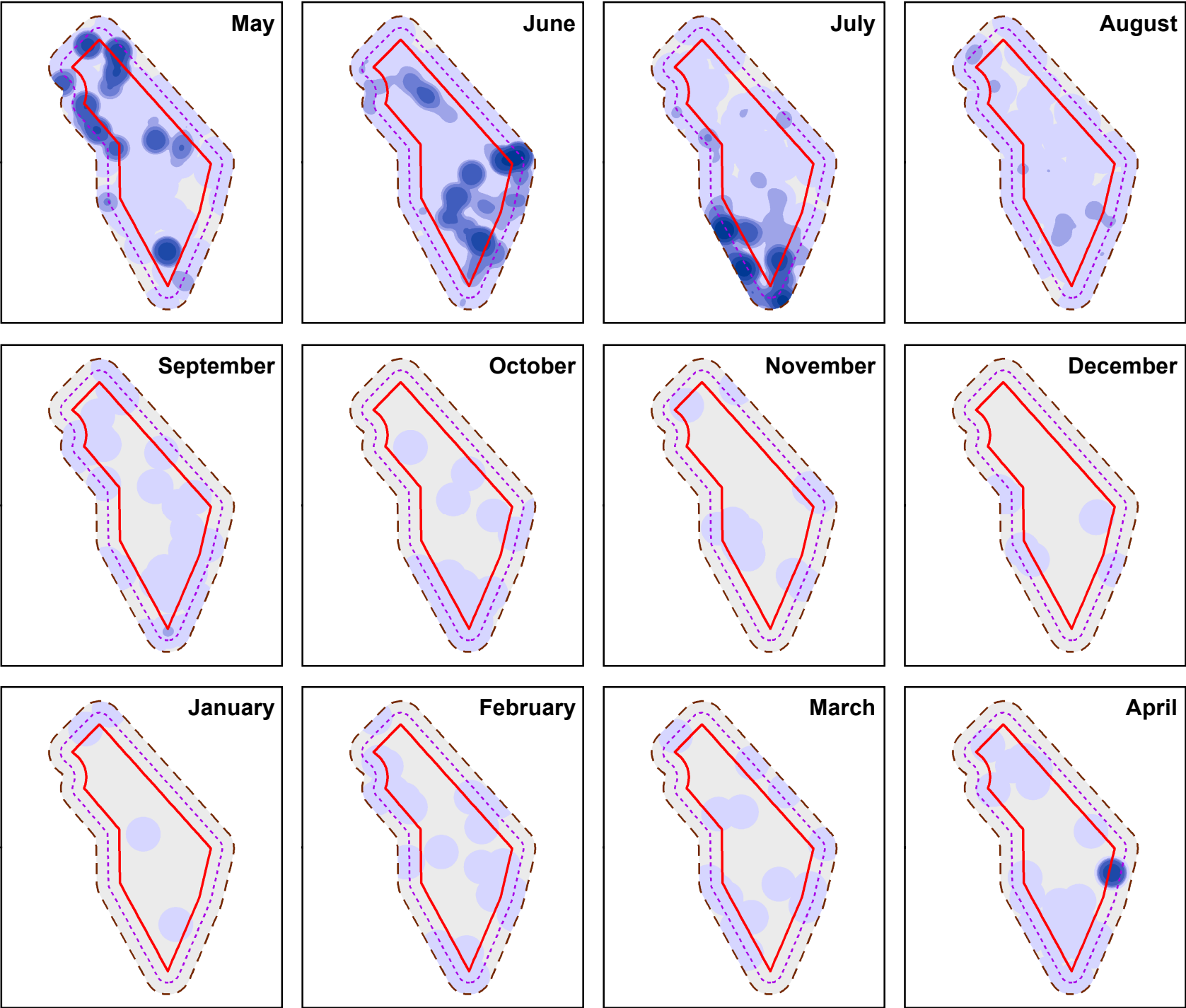
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Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Kittiwake Relative Density

0

0 - 5

5 - 10

10 - 20

20 - 50

50 - 100

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0 5 10 15 20 25 30 km

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Figure 1-2: Distribution of kittiwake between May 2022 and April 2023

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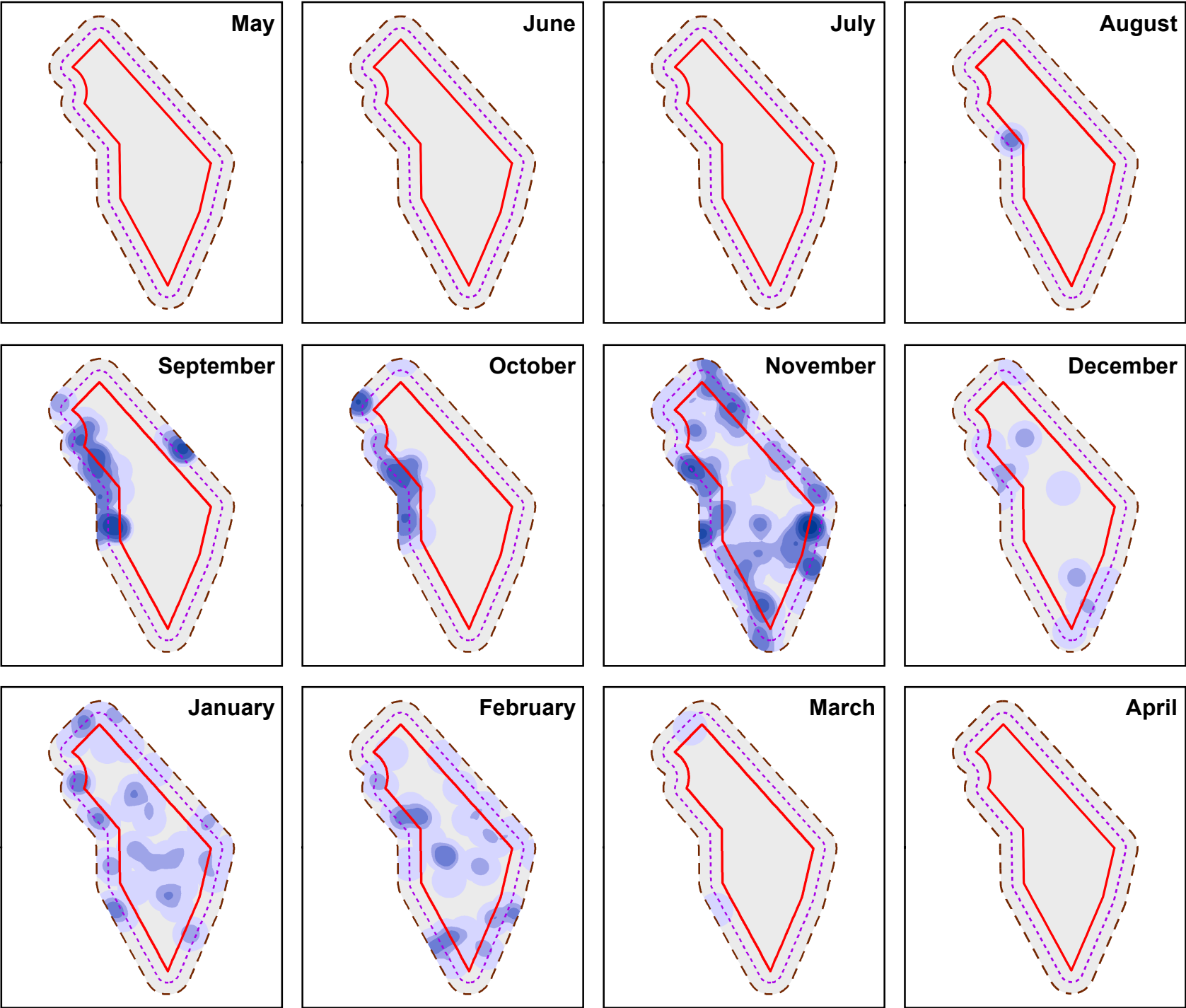
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1.3 Great Black-backed Gull

- 1.3.1.1 Spatial distribution maps, generated using design-based estimates, for great black-backed gull throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-3 and Figure 1-4, respectively.



Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Great black-backed gull

Relative Density

0

0 - 1

1 - 2

2 - 5

5 - 10

10 - 20

20 - 28

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0

5

10

15

20

25

30

km

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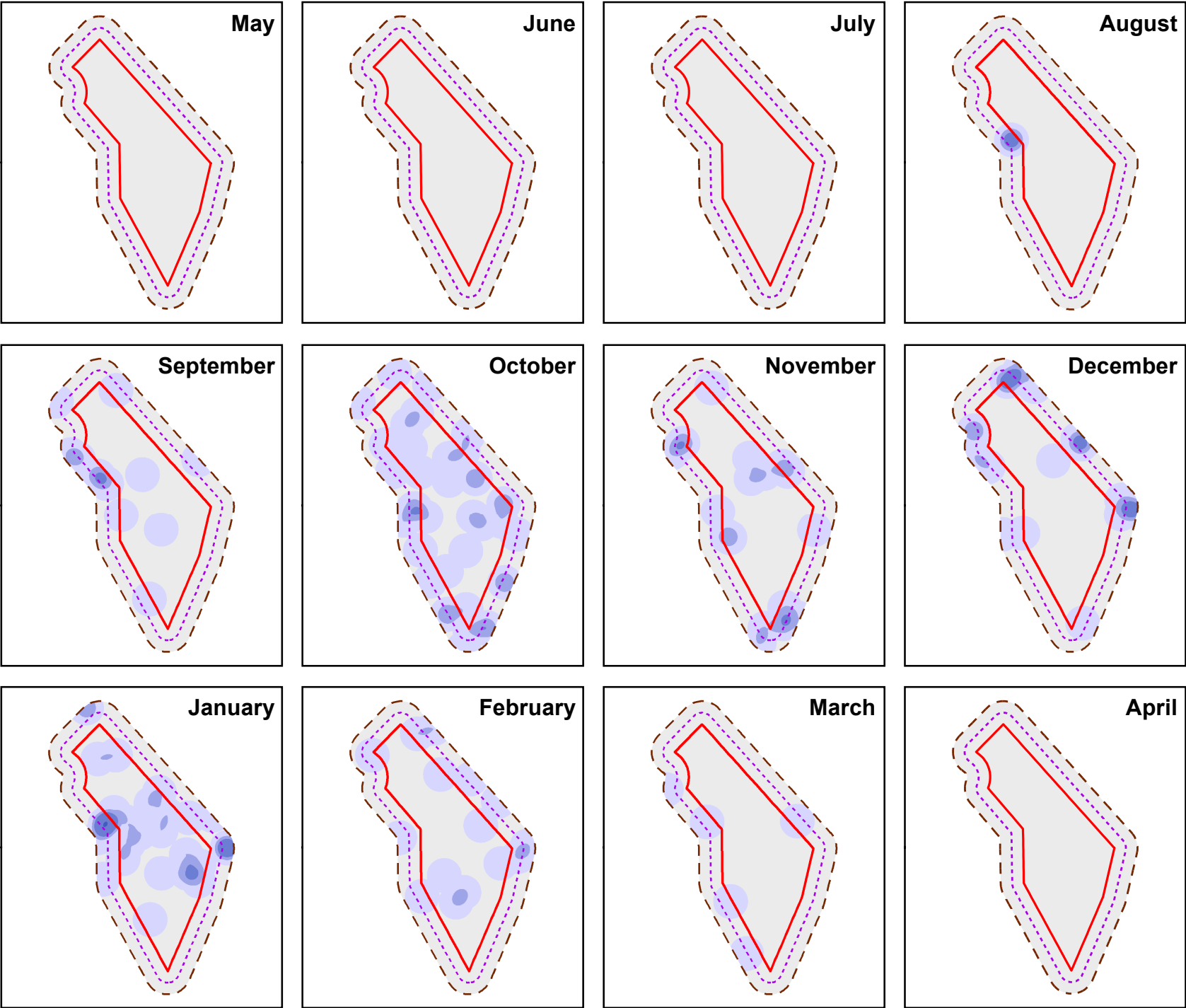
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Figure 1-3: Distribution of great black-backed gull between May 2021 and April 2022

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Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Great black-backed gull

Relative Density

0

0 - 1

1 - 2

2 - 5

5 - 10

10 - 20

20 - 28

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Figure 1-4: Distribution of great black-backed gull between May 2022 and April 2023

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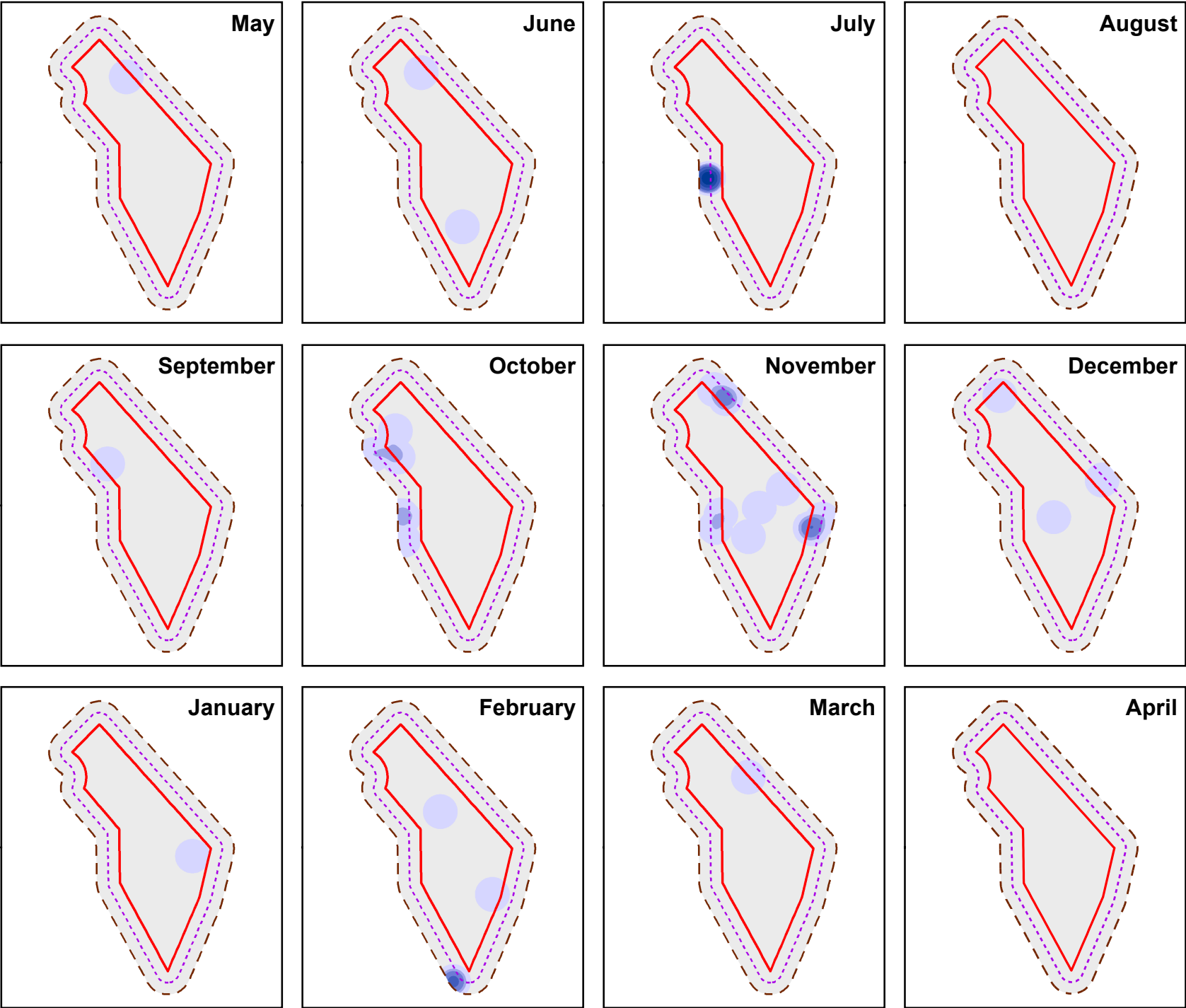
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1.4 Herring Gull

- 1.4.1.1 Spatial distribution maps, generated using design-based estimates, for herring gull throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-5 and Figure 1-6, respectively.



Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Herring gull Relative Density

0

0 - 1

1 - 2

2 - 4

4 - 8

8 - 12

12 - 16

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Figure 1-5: Distribution of herring gull between
May 2021 and April 2022

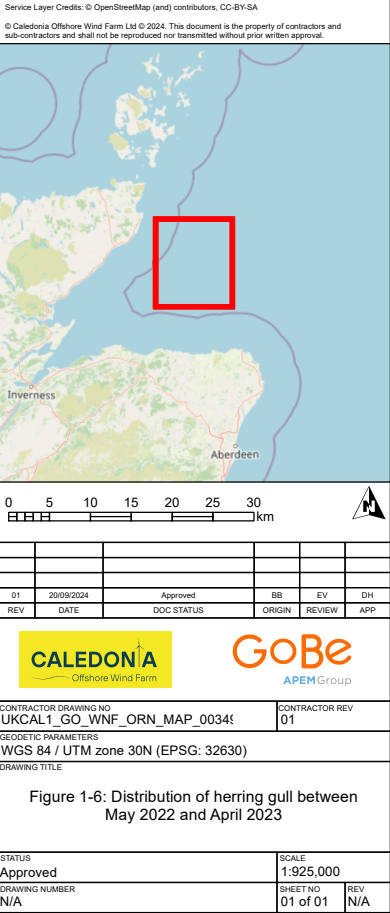
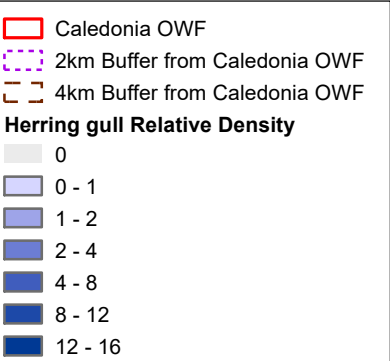
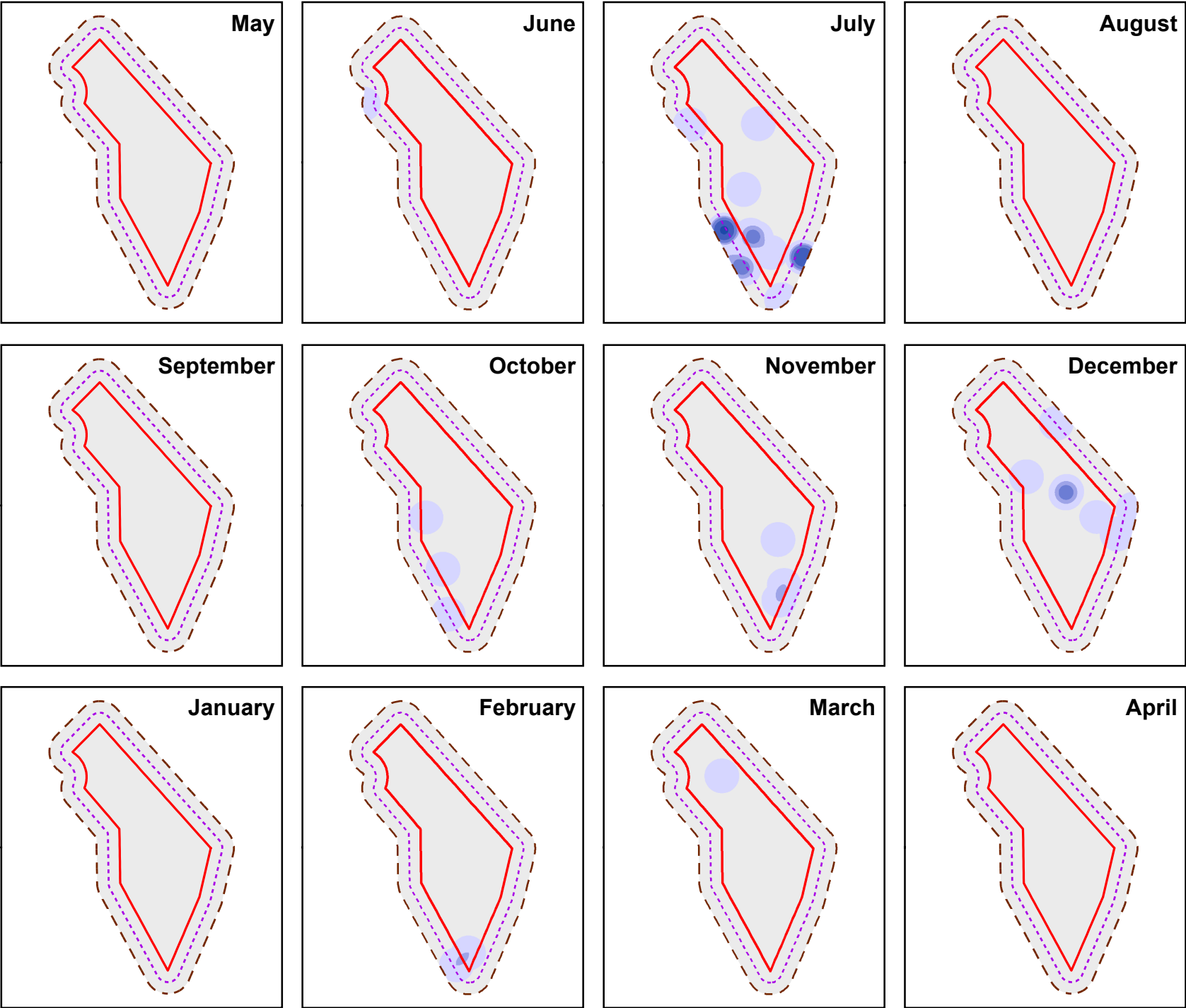
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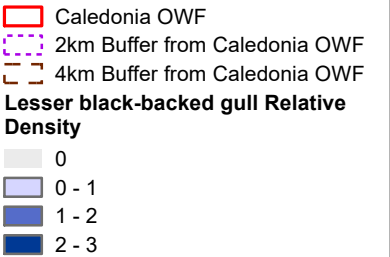
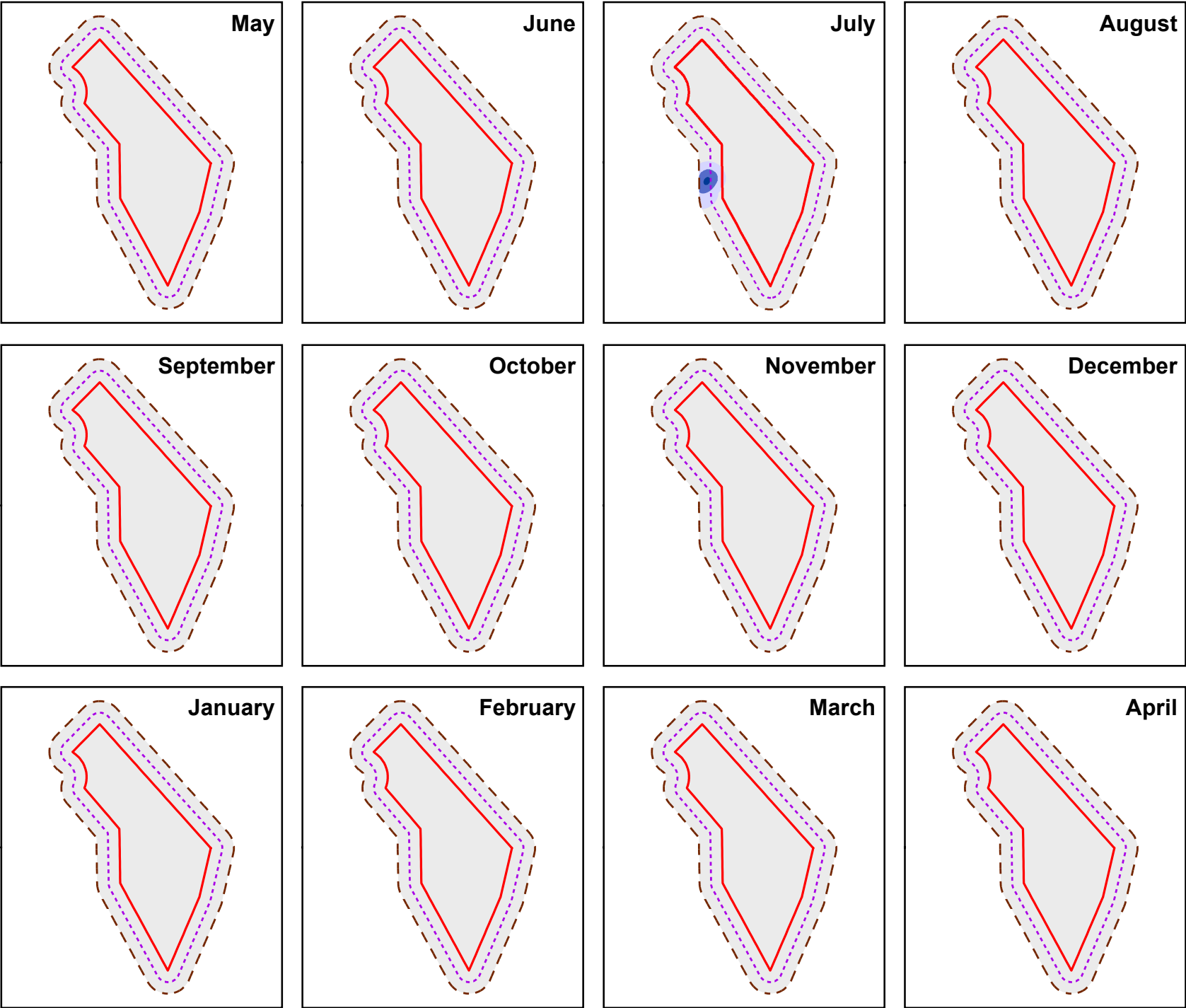
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1.5 Lesser Black-backed Gull

- 1.5.1.1 Spatial distribution maps, generated using design-based estimates, for lesser black-backed gull throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-7 and Figure 1-8, respectively.



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0 5 10 15 20 25 30 km

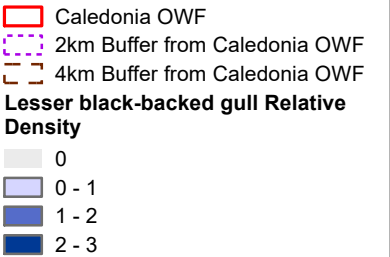
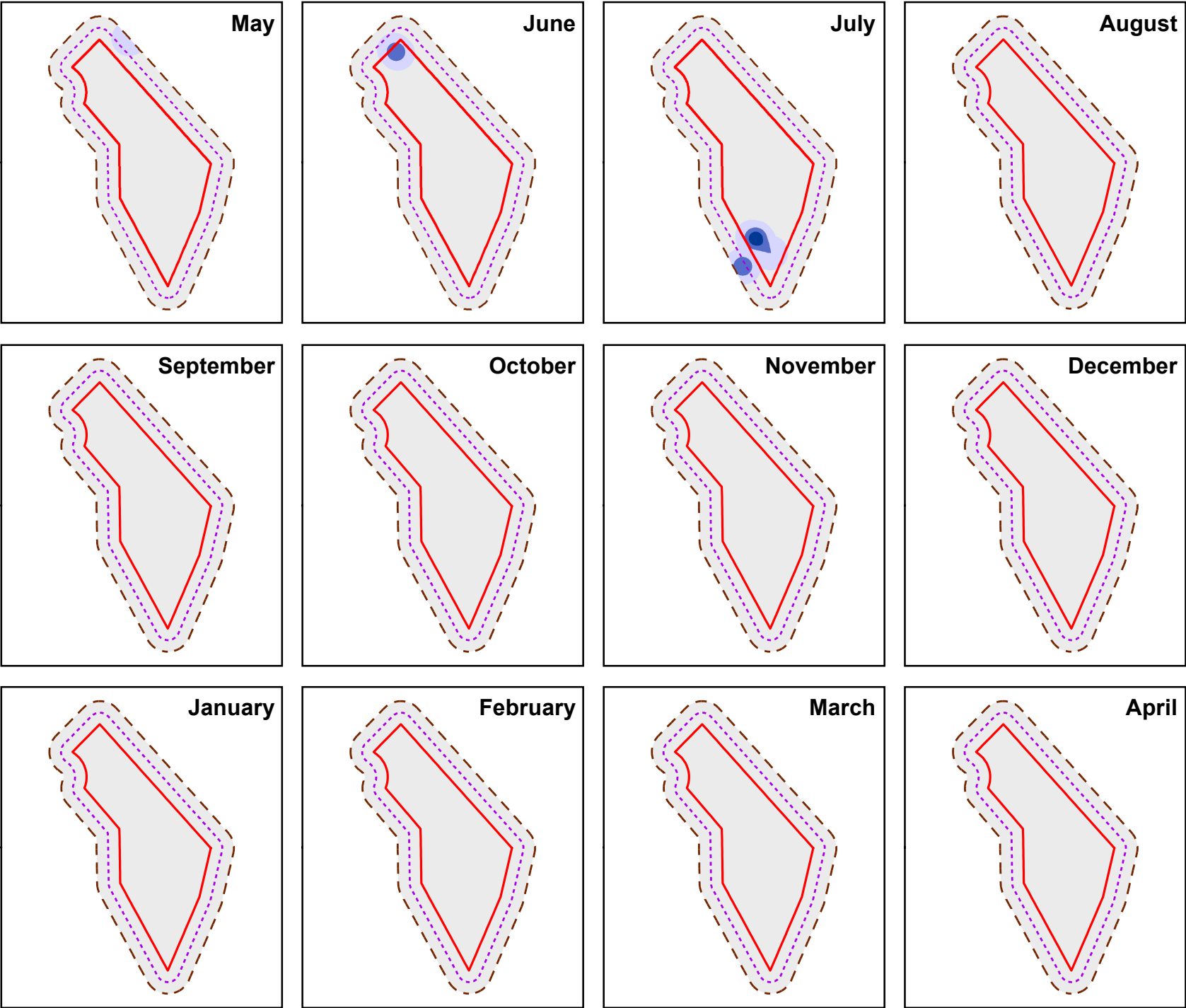
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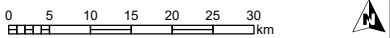
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GEOGRAPHIC PARAMETERS WGS 84 / UTM zone 30N (EPSG: 32630)			
DRAWING TITLE Figure 1-7: Distribution of lesser black-backed gull between May 2021 and April 2022			

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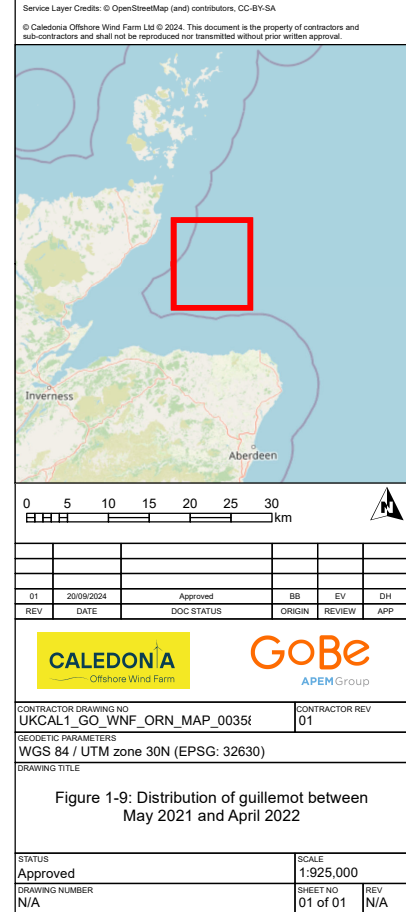
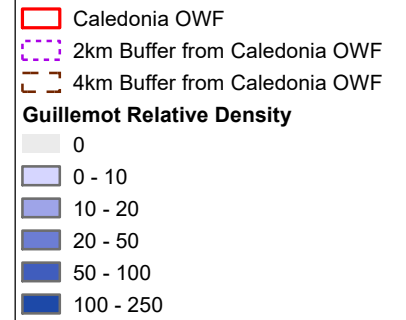
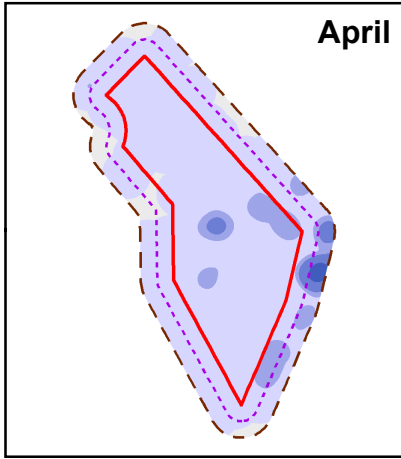
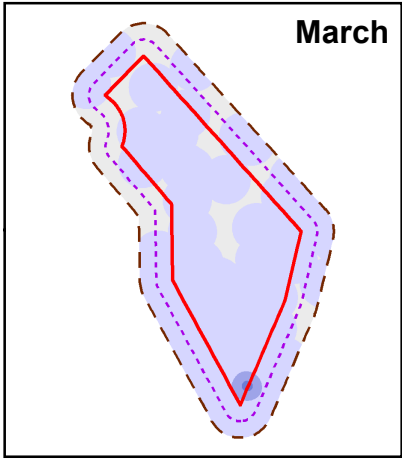
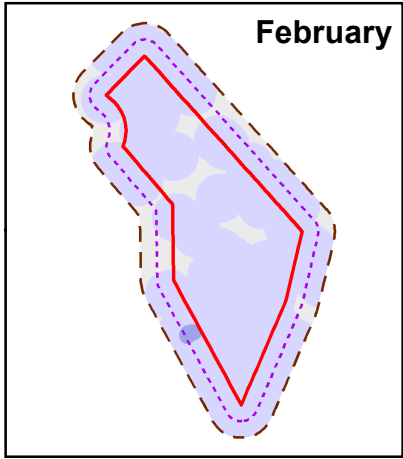
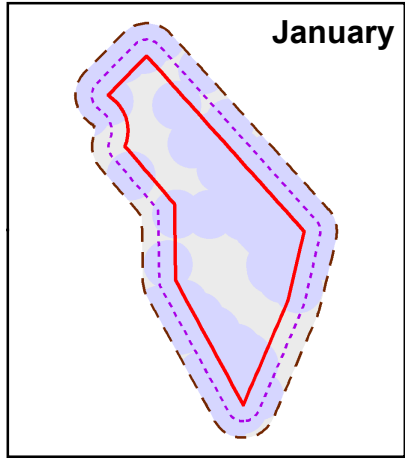
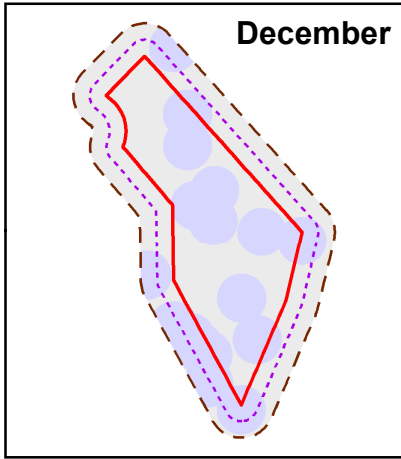
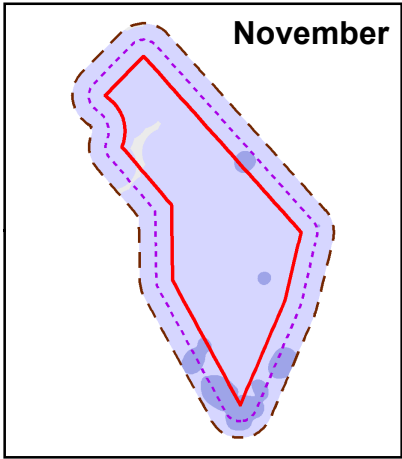
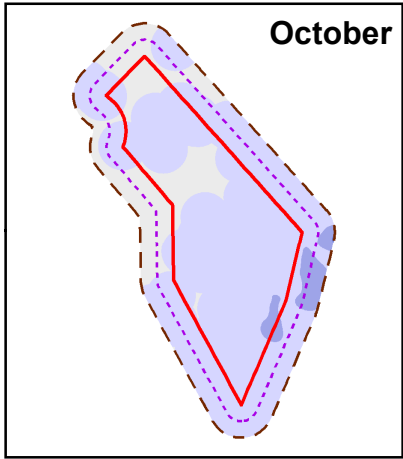
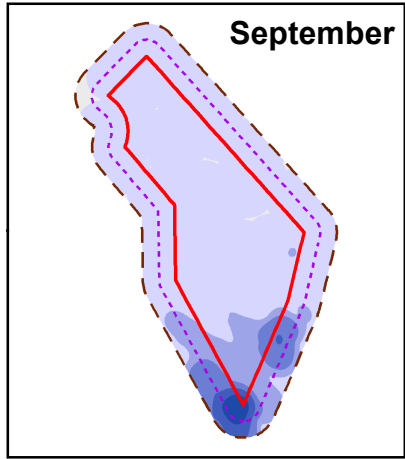
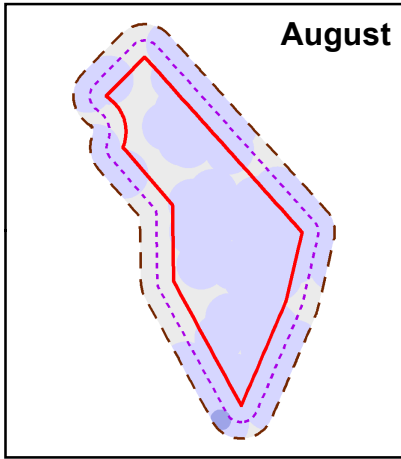
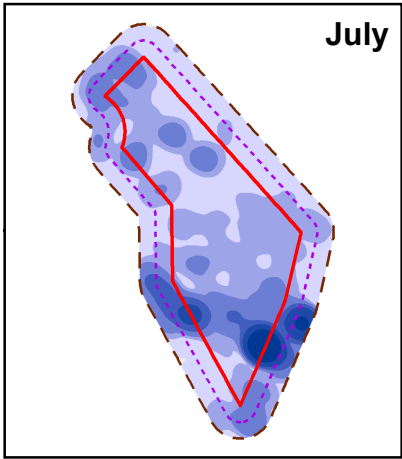
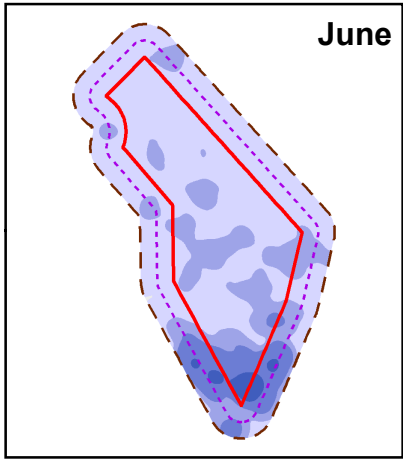
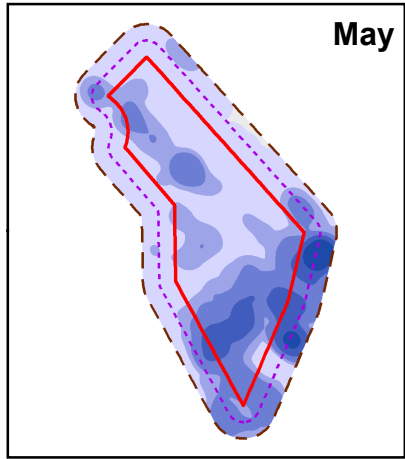
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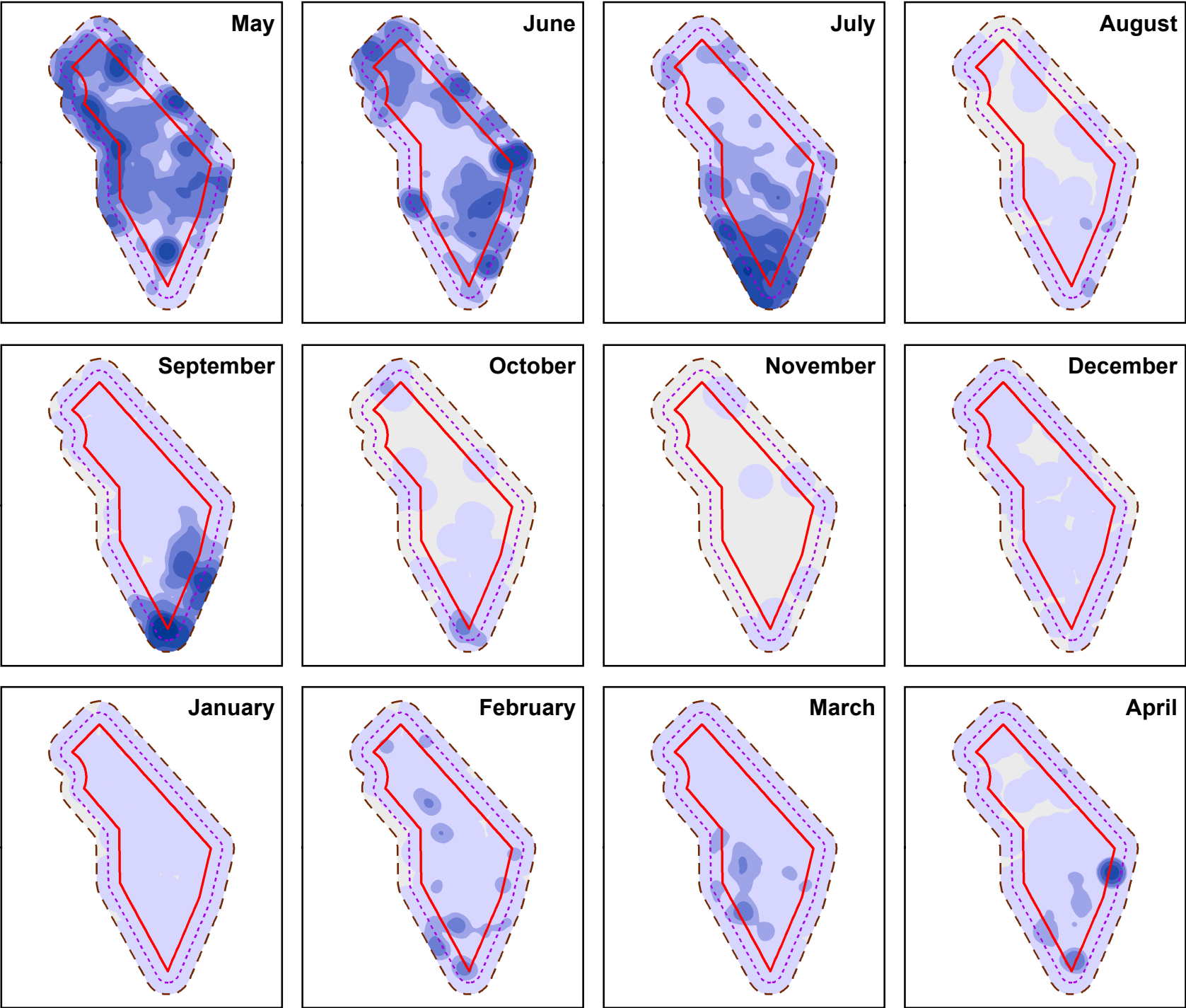
Figure 1-8: Distribution of lesser black-backed gull between May 2022 and April 2023

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1.6 Guillemot

- 1.6.1.1 Spatial distribution maps, generated using design-based estimates, for guillemot throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-9 and Figure 1-10, respectively.





Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Guillemot Relative Density

0

0 - 10

10 - 20

20 - 50

50 - 100

100 - 250

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0

5

10

15

20

25

30

km

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Figure 1-10: Distribution of guillemot between May 2022 and April 2023

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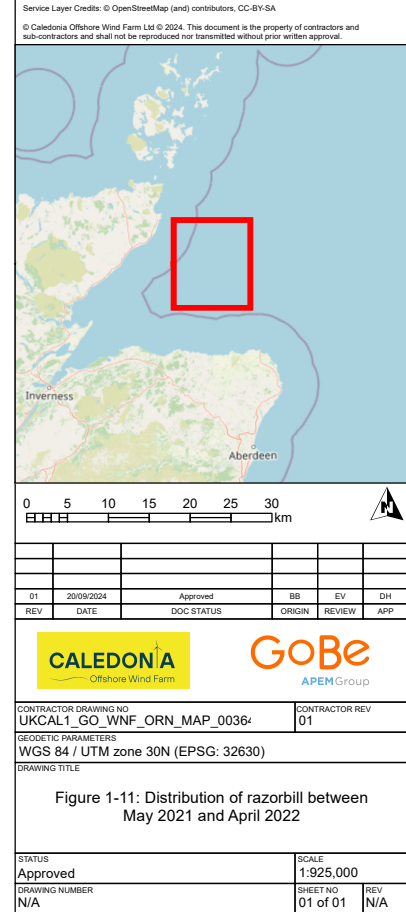
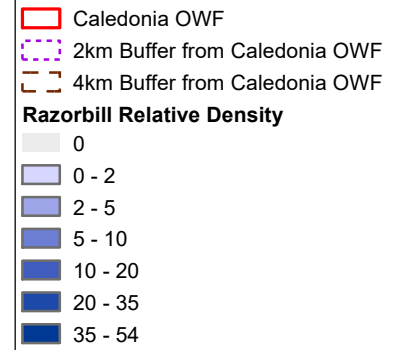
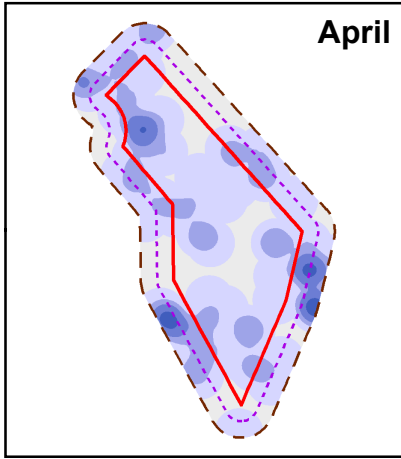
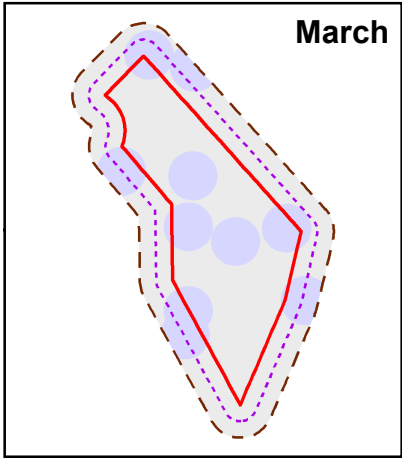
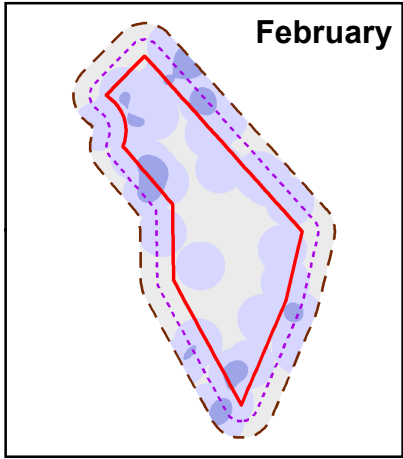
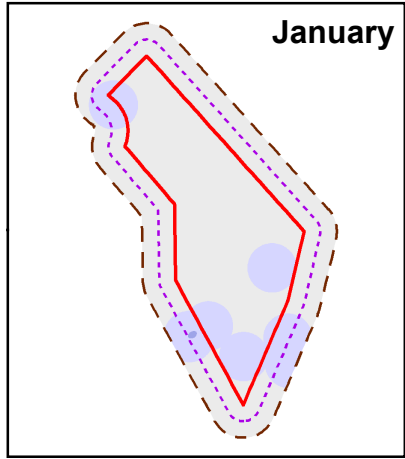
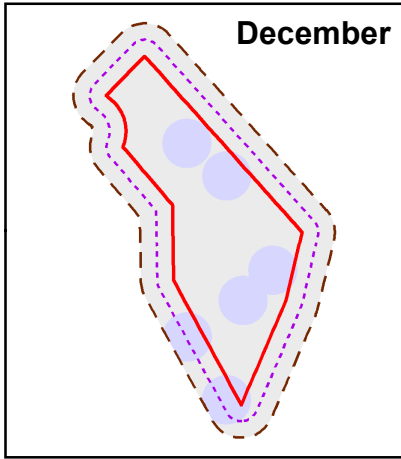
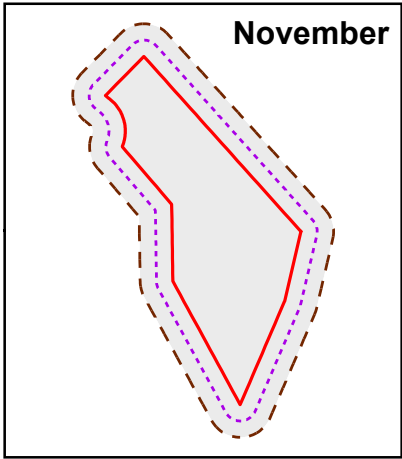
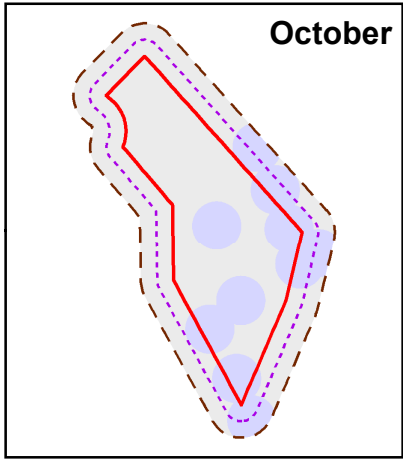
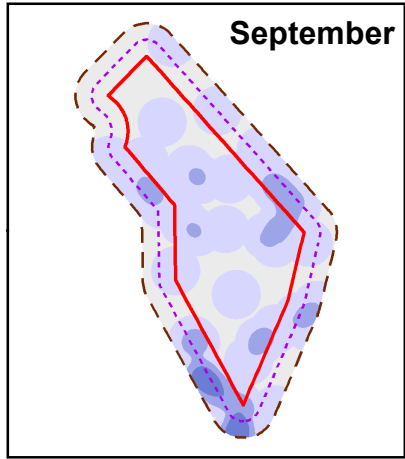
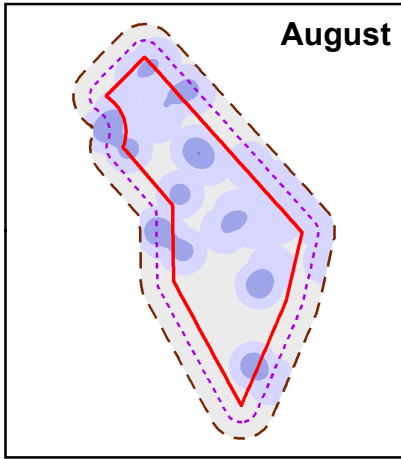
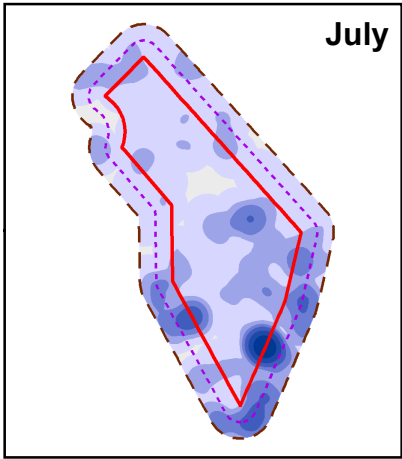
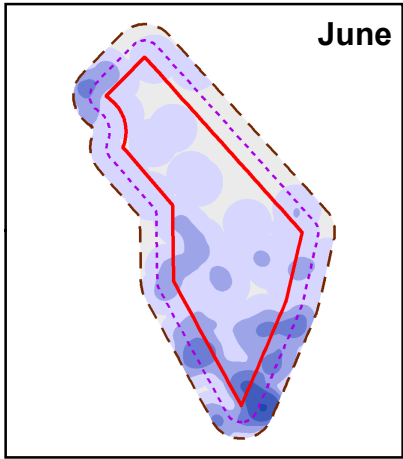
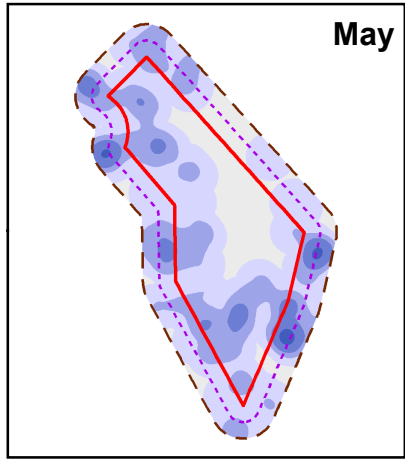
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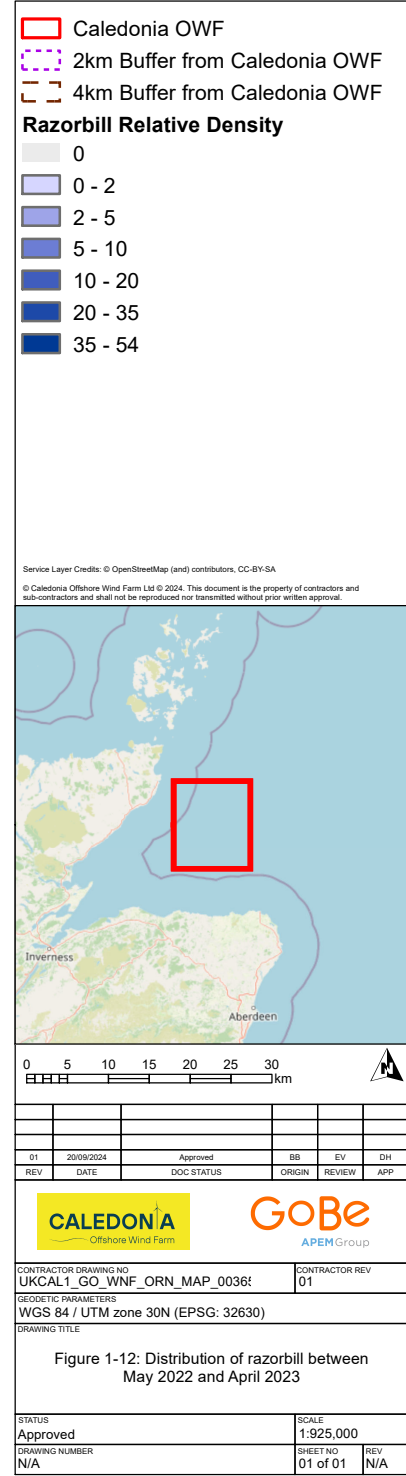
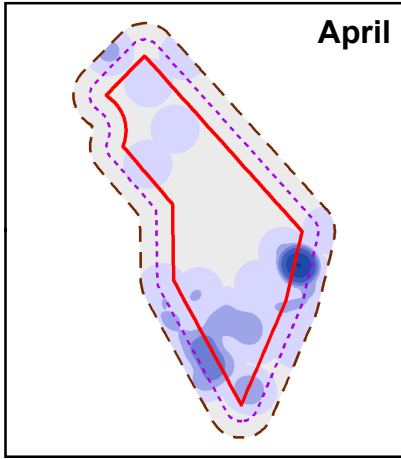
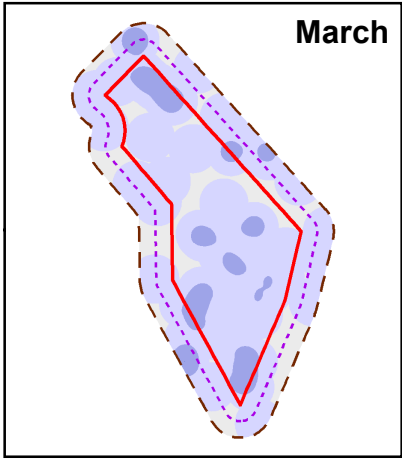
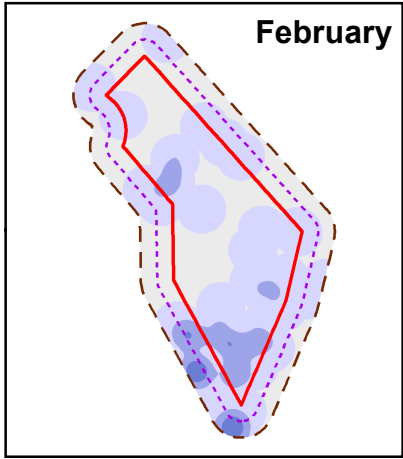
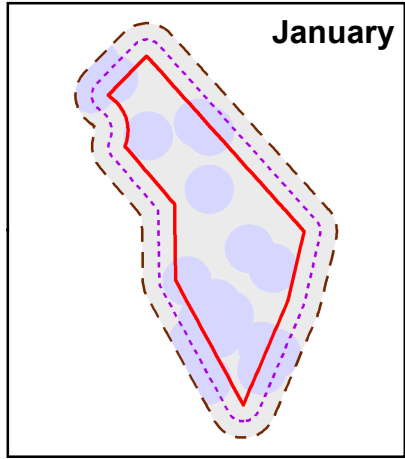
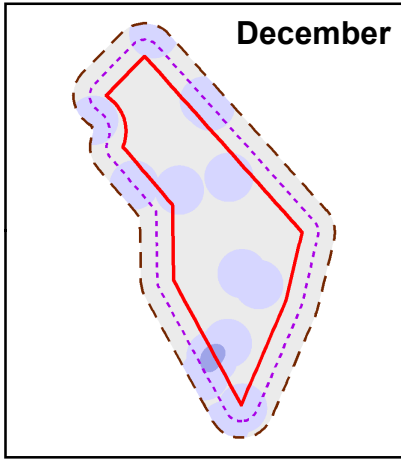
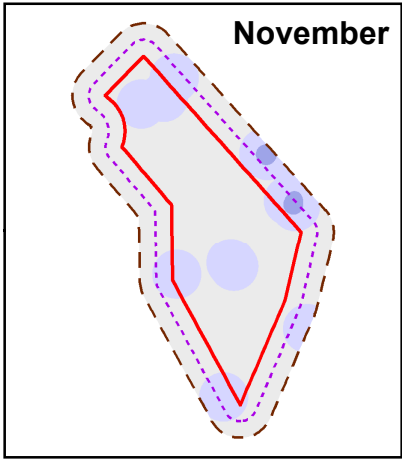
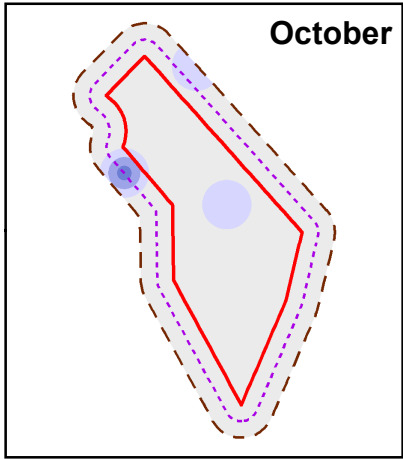
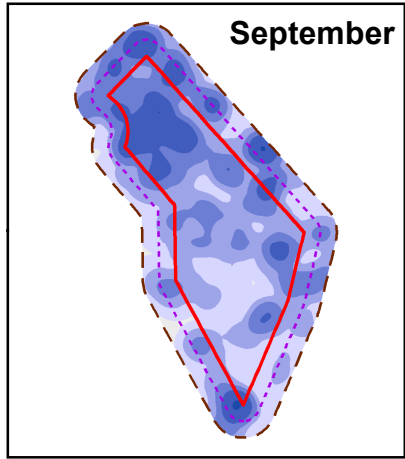
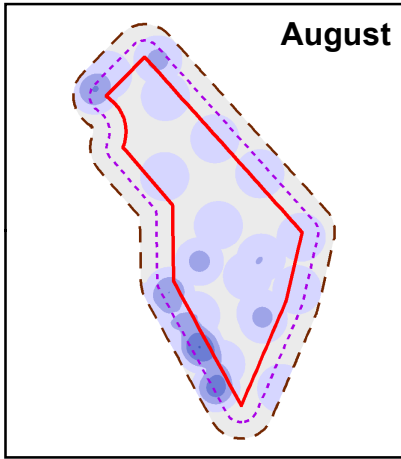
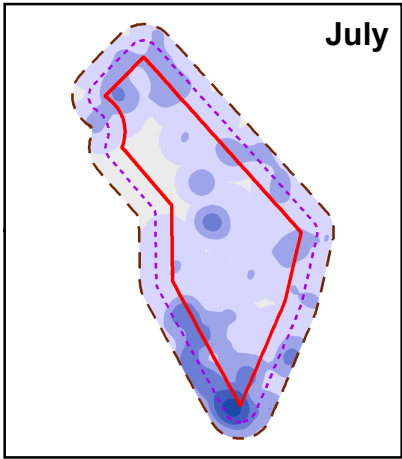
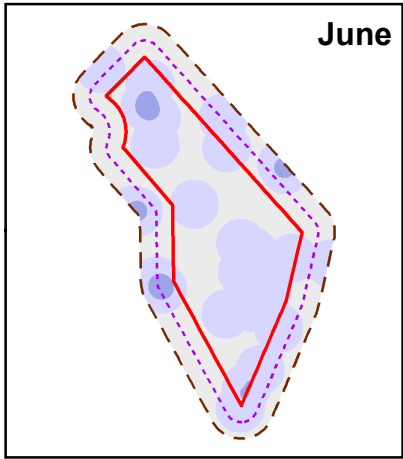
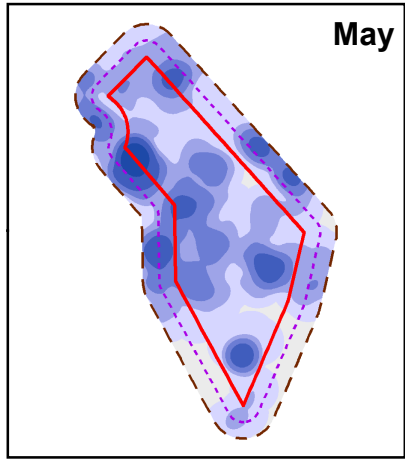
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1.7 Razorbill

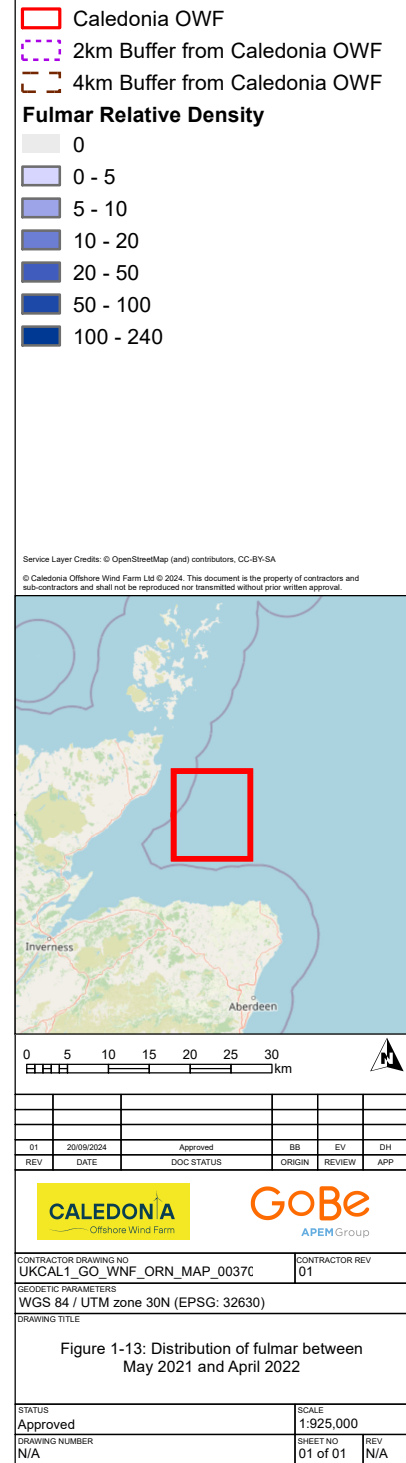
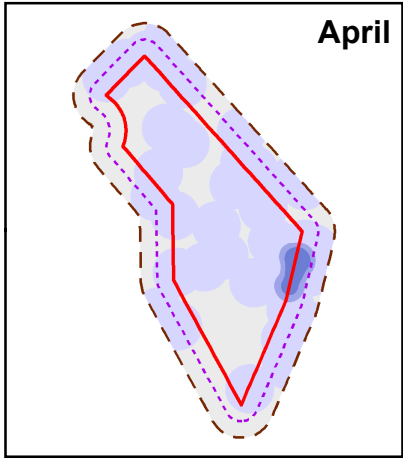
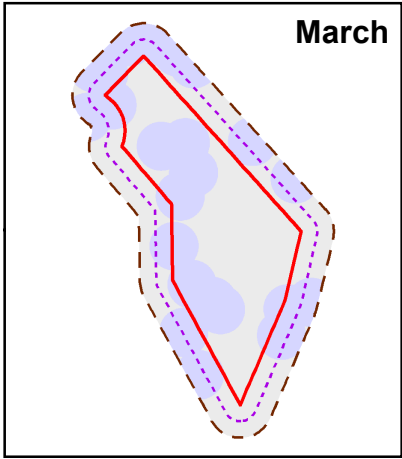
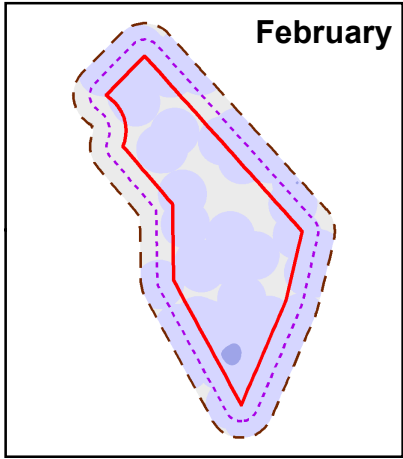
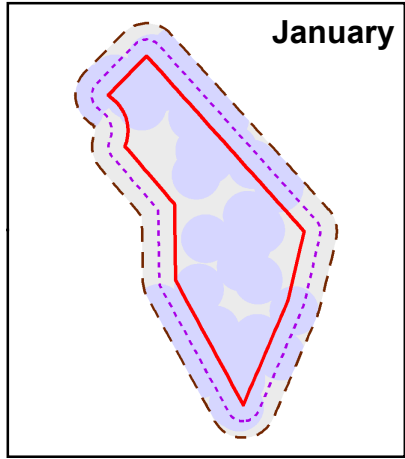
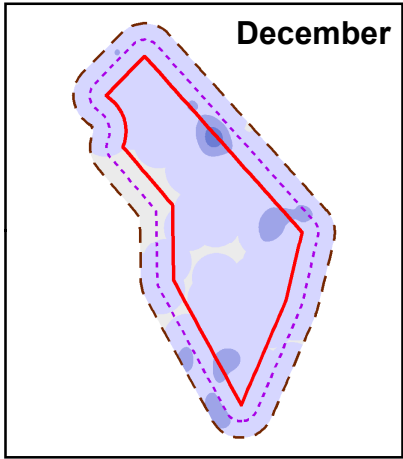
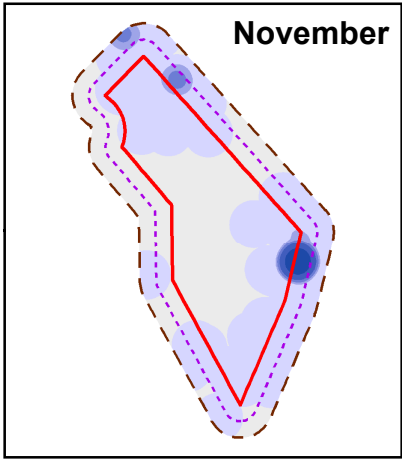
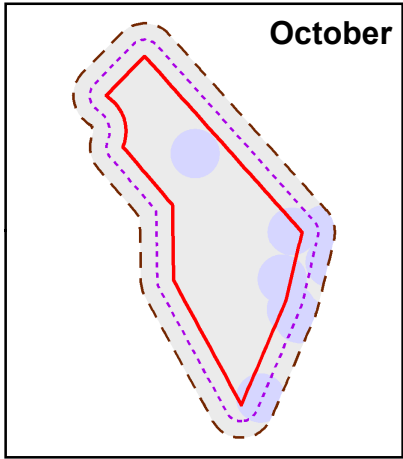
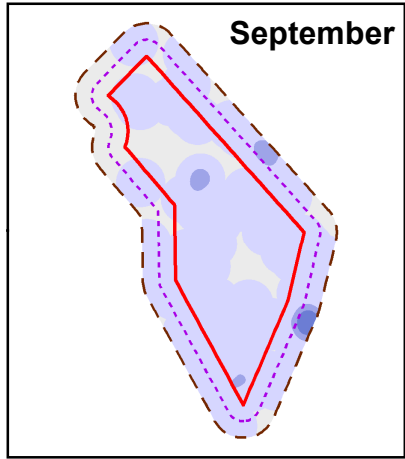
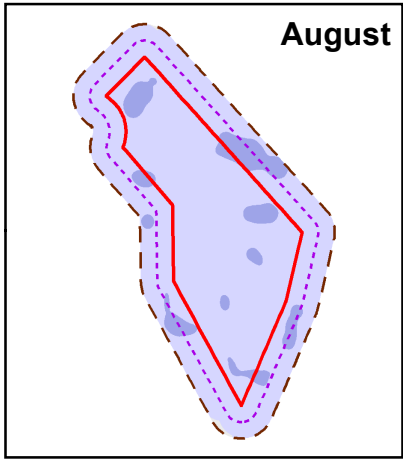
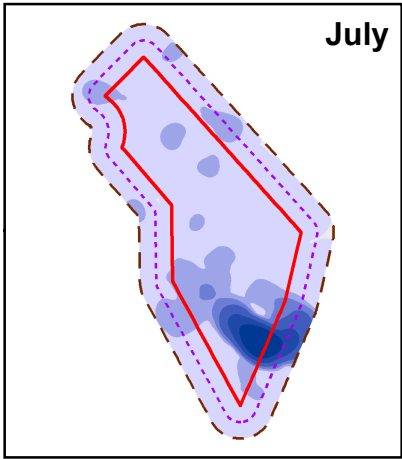
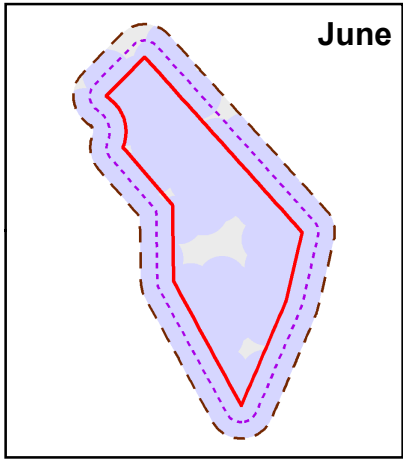
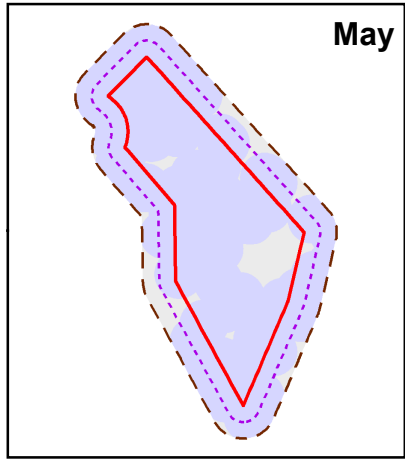
- 1.7.1.1 Spatial distribution maps, generated using design-based estimates, for razorbill throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-11 and Figure 1-12, respectively.

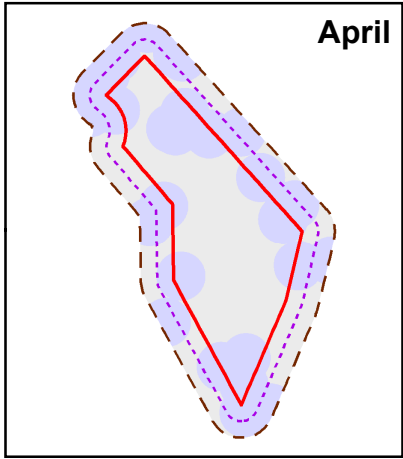
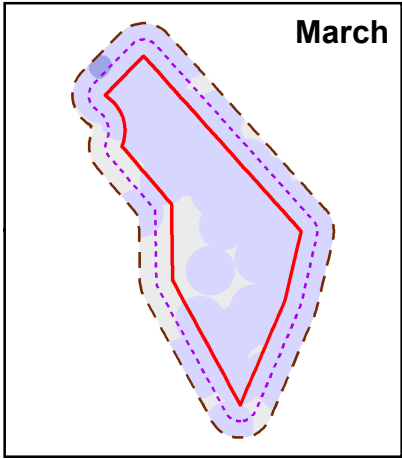
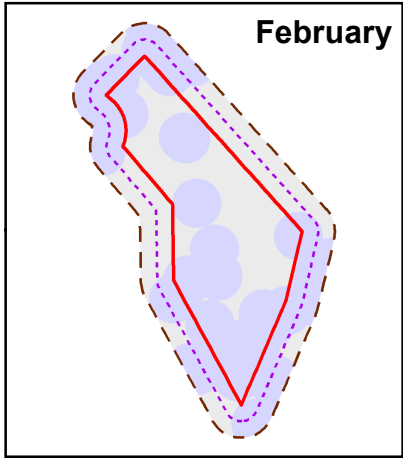
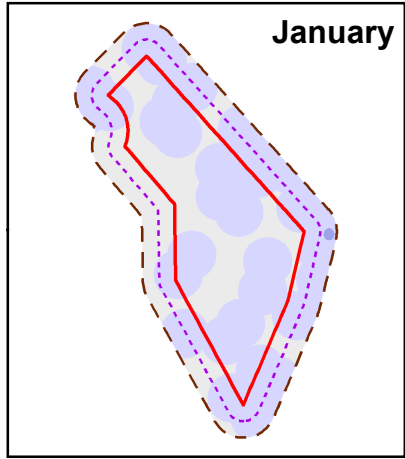
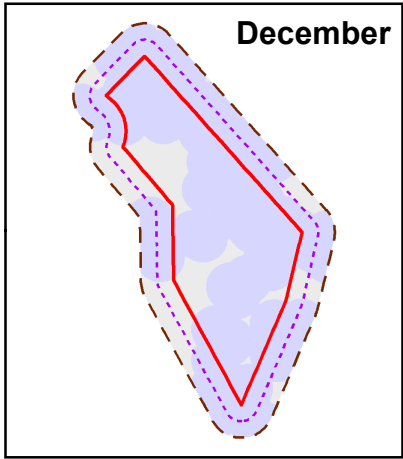
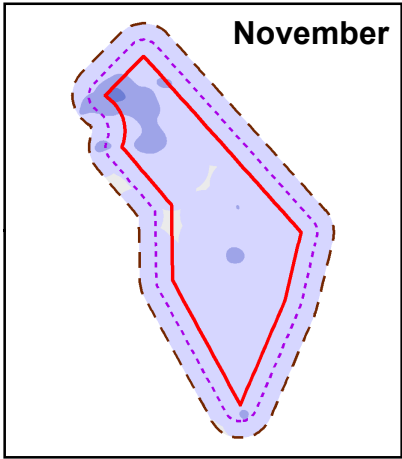
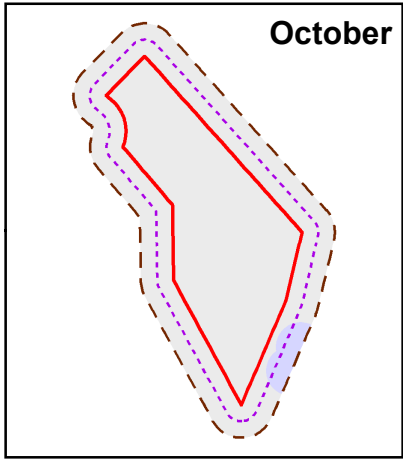
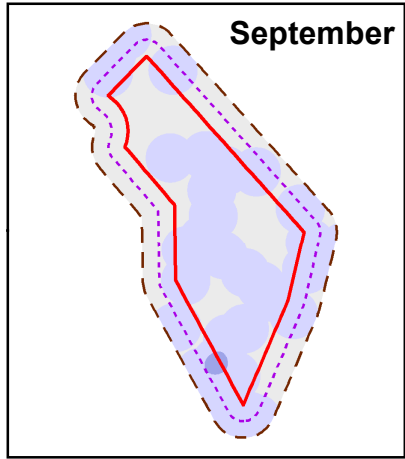
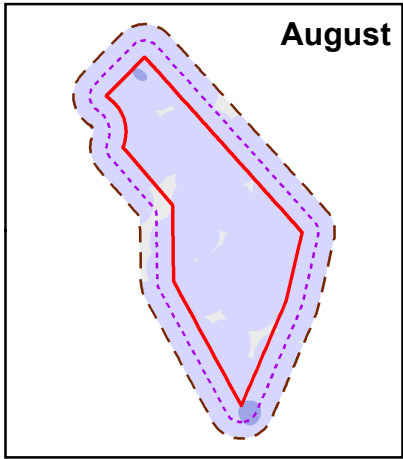
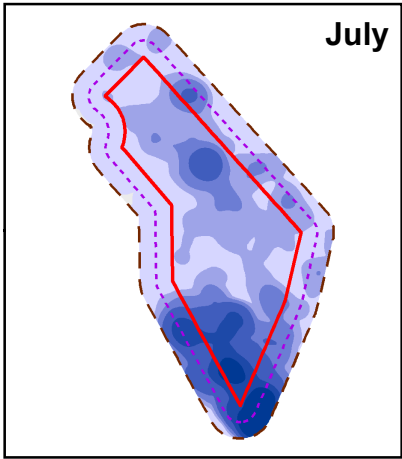
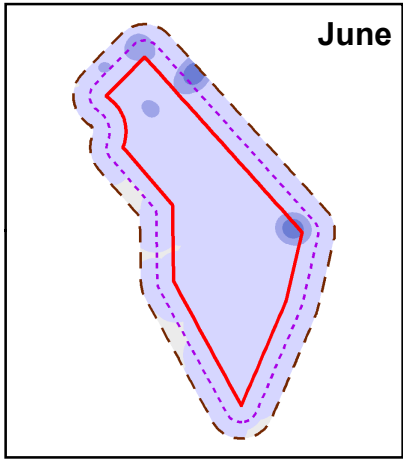
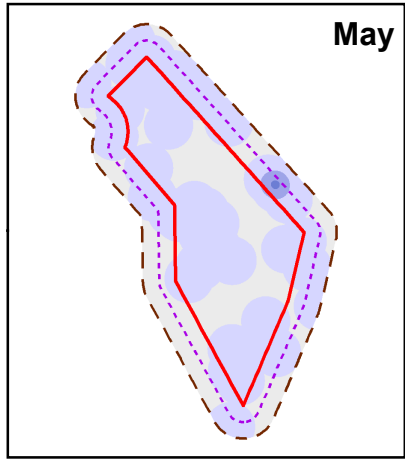




1.8 Fulmar

- 1.8.1.1 Spatial distribution maps, generated using design-based estimates, for fulmar throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-13 and Figure 1-14, respectively.





Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Fulmar Relative Density

0

0 - 5

5 - 10

10 - 20

20 - 50

50 - 100

100 - 240

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0 5 10 15 20 25 30 km

REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP
01	20/09/2024	Approved	BB	EV	DH

CALEDONIA
Offshore Wind Farm

GoBe
APEM Group

CONTRACTOR DRAWING NO
UKCAL1_GO_WNF_ORN_MAP_00371

CONTRACTOR REV
01

COORDINATE PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE
Figure 1-14: Distribution of fulmar between May 2022 and April 2023

STATUS
Approved

SCALE
1:925,000

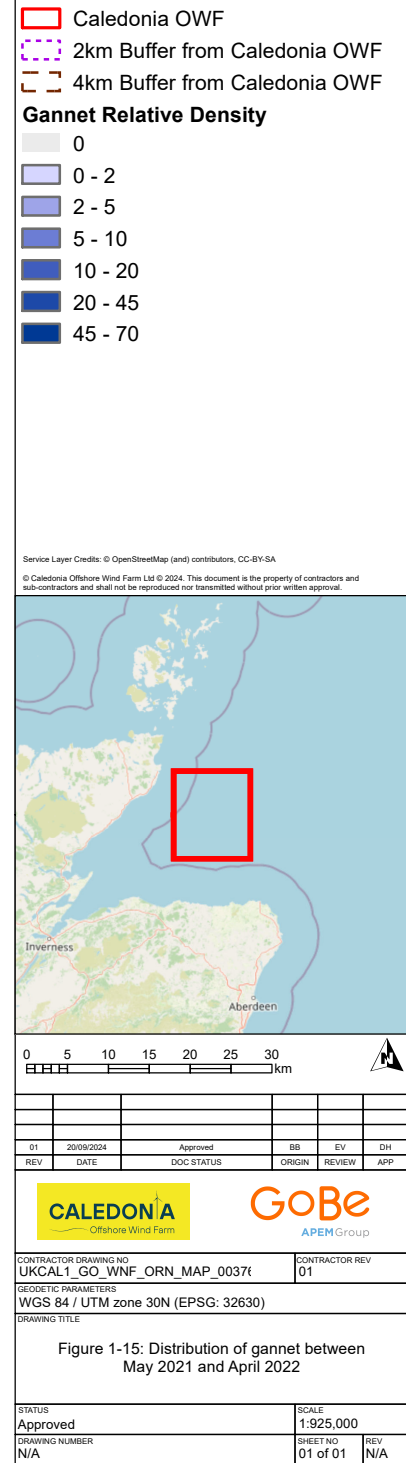
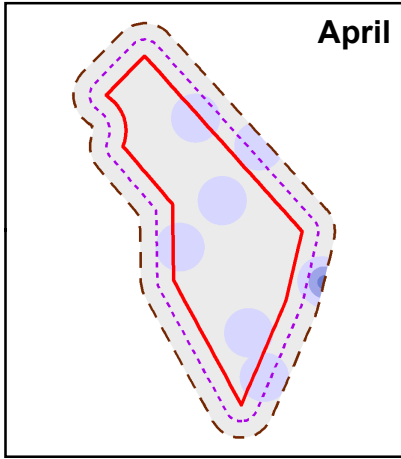
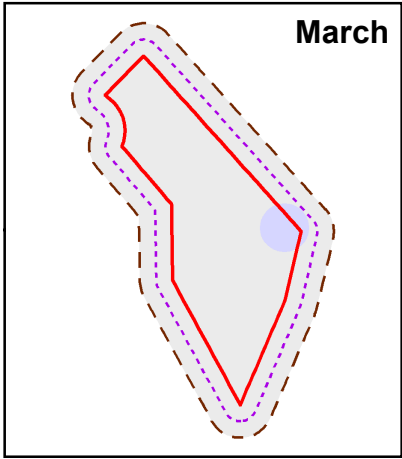
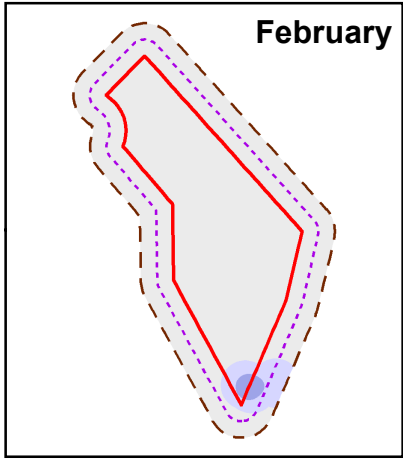
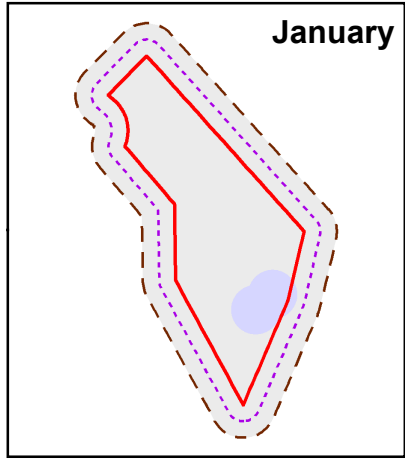
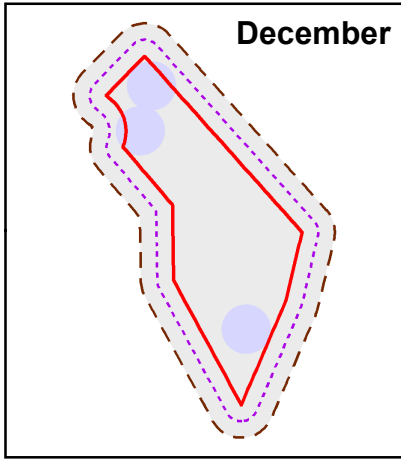
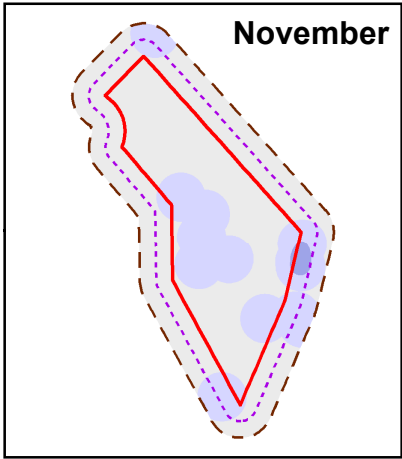
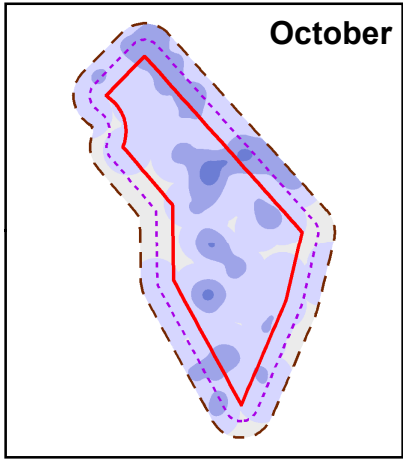
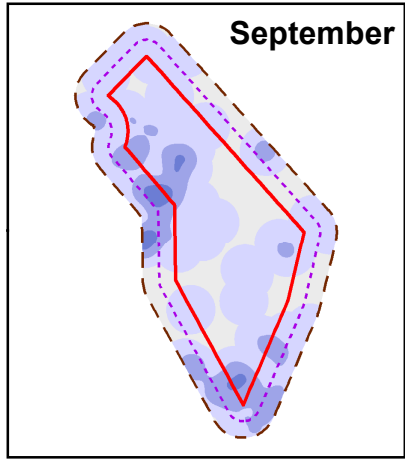
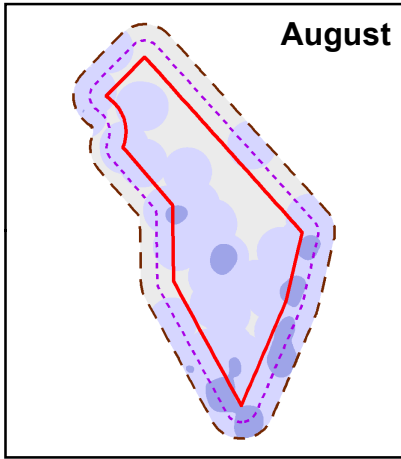
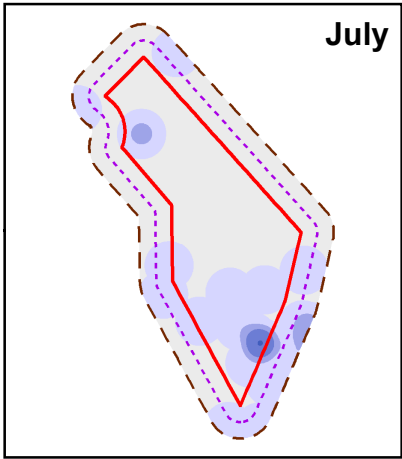
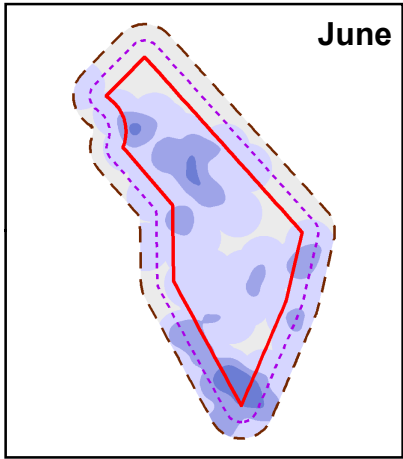
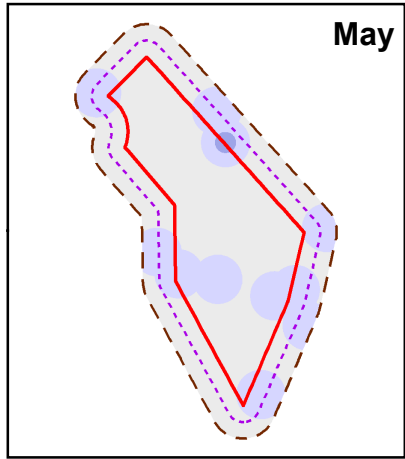
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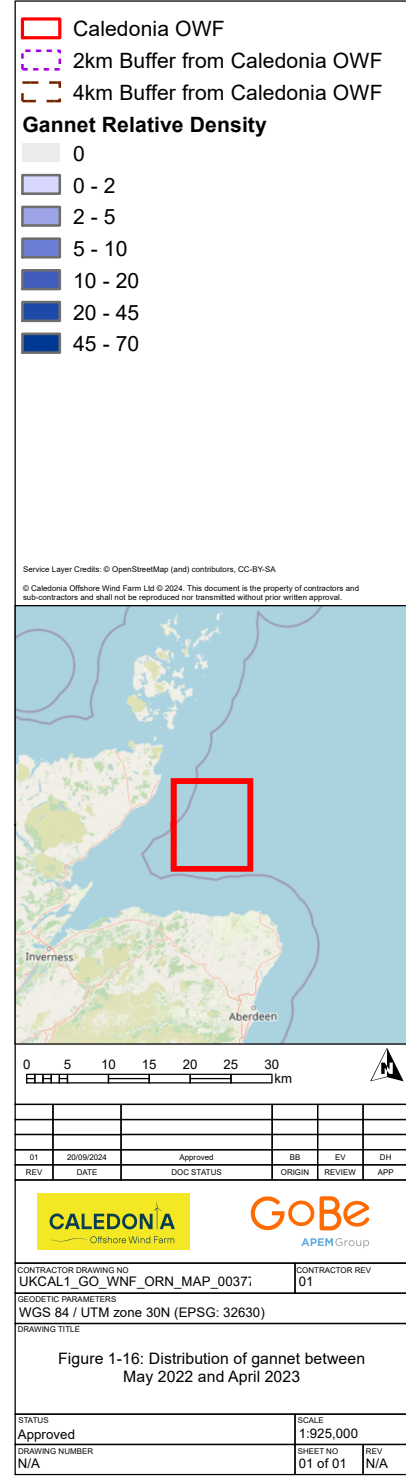
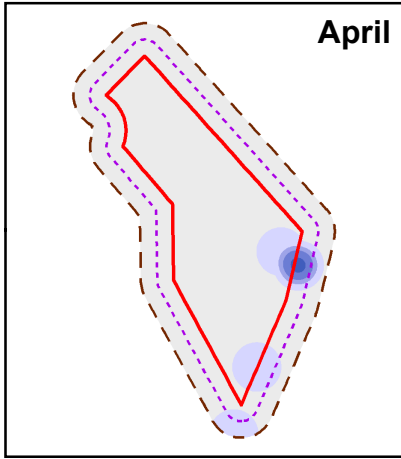
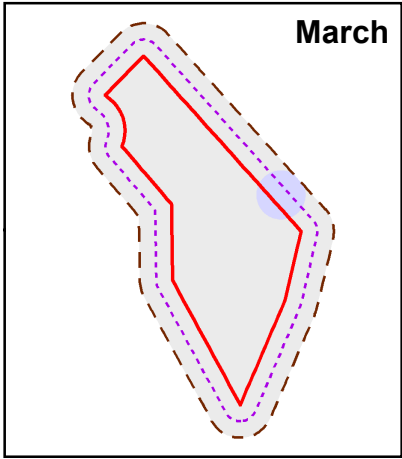
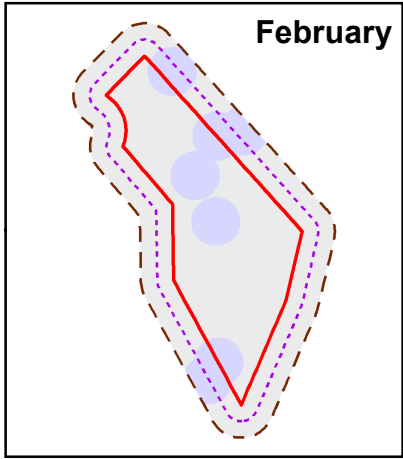
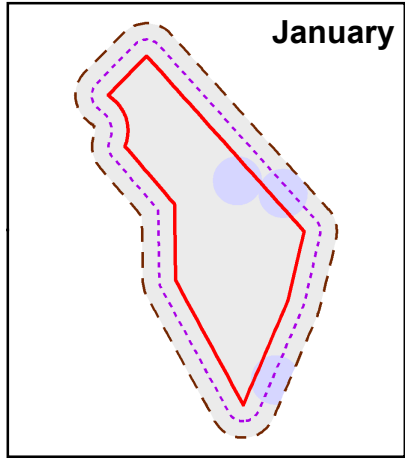
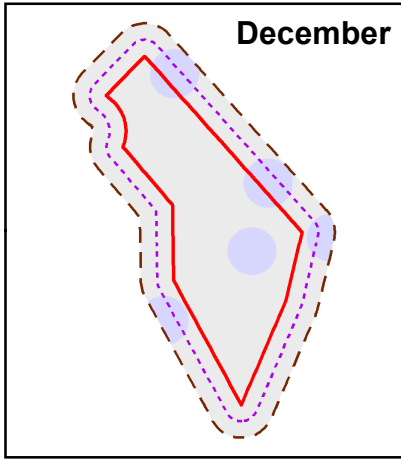
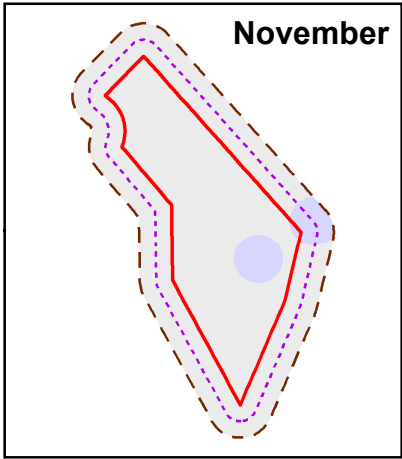
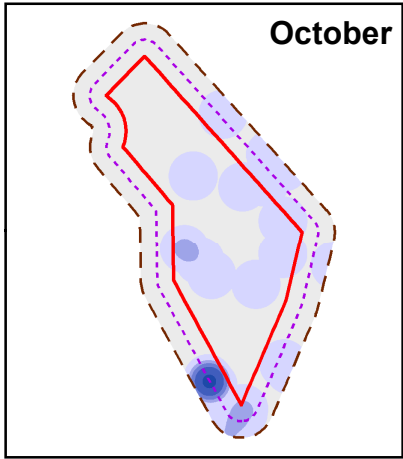
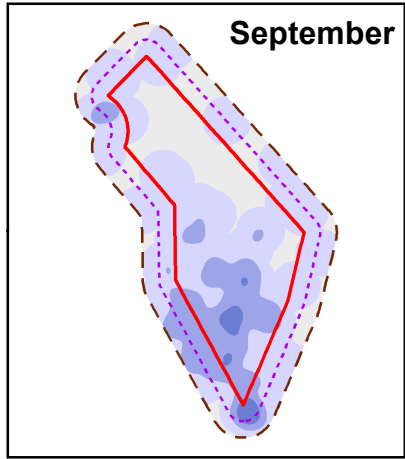
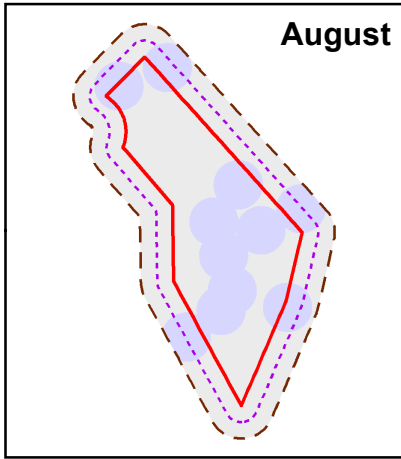
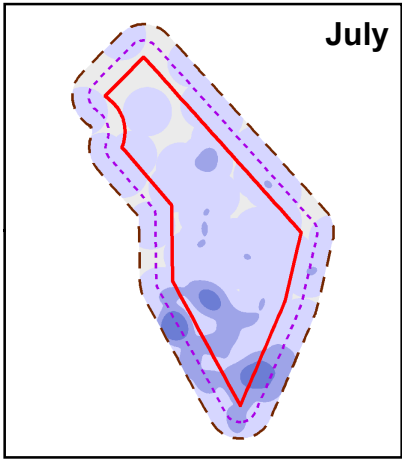
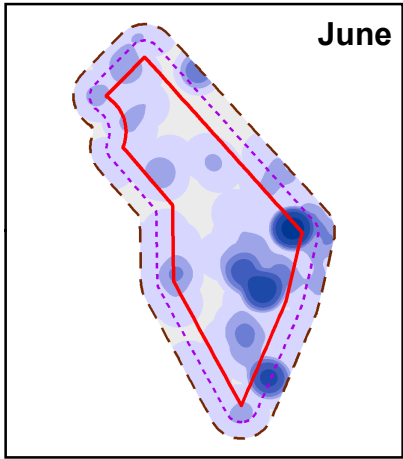
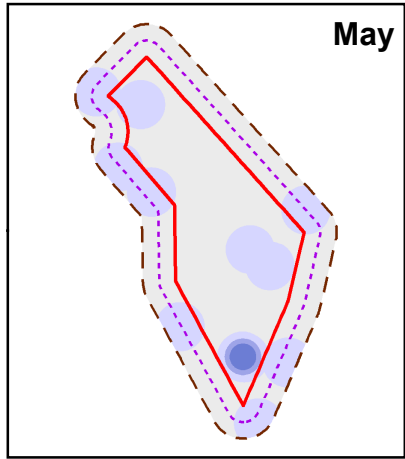
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1.9 Gannet

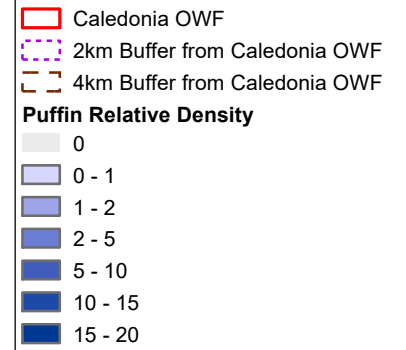
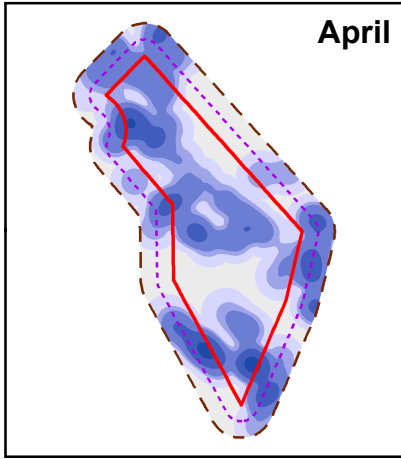
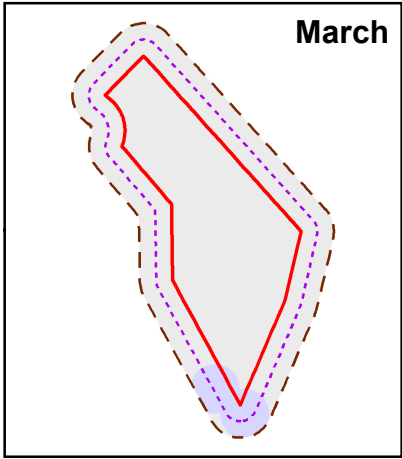
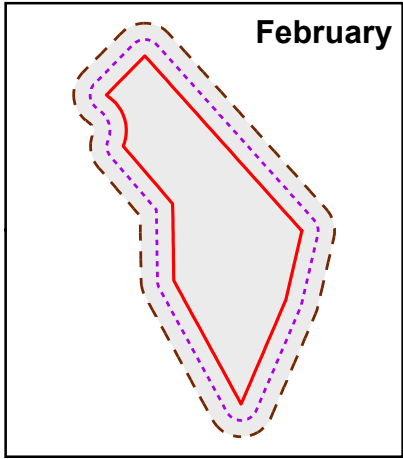
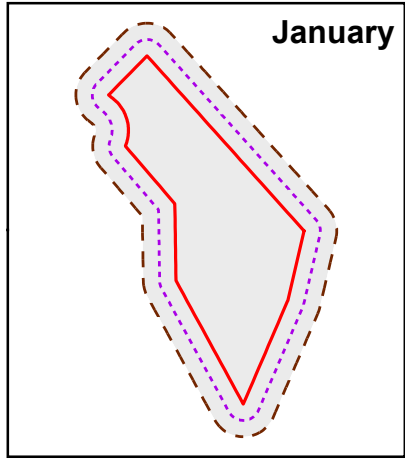
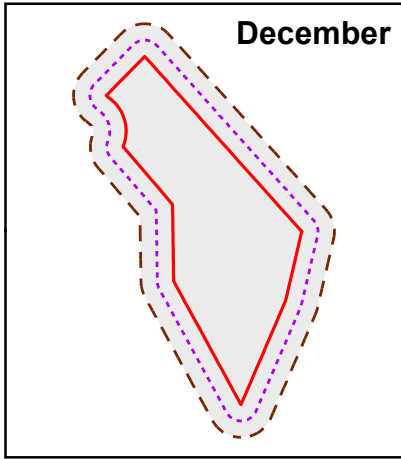
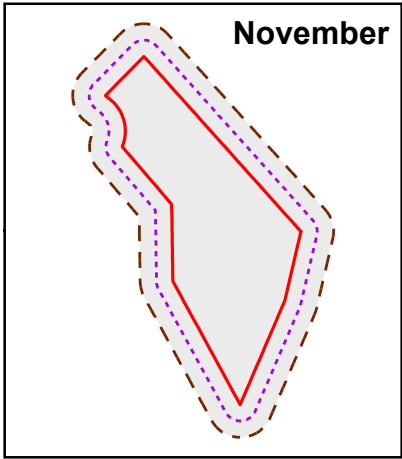
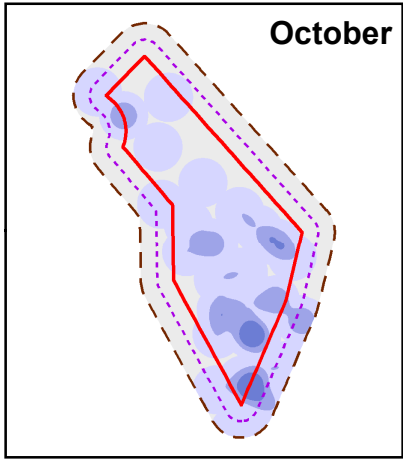
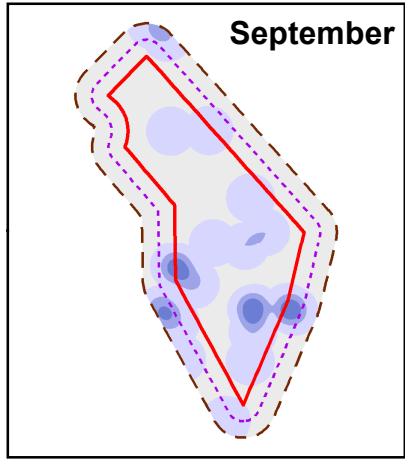
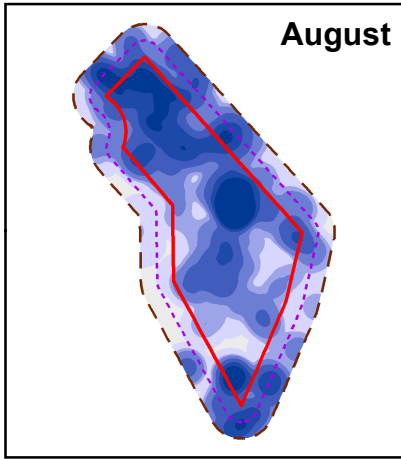
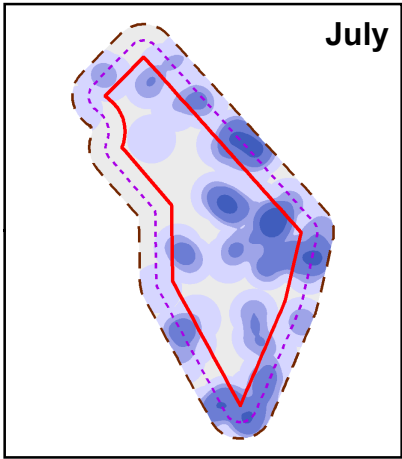
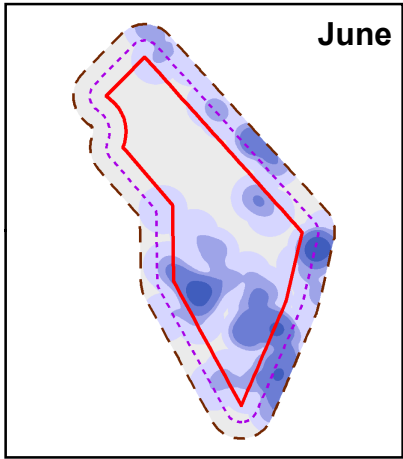
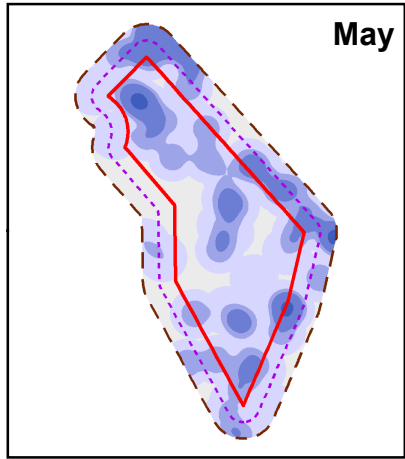
- 1.9.1.1 Spatial distribution maps, generated using design-based estimates, for gannet throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-15 and Figure 1-16, respectively.





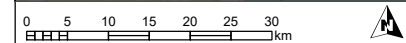
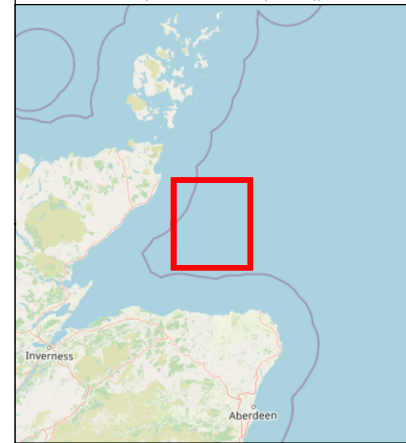
1.10 Puffin

- 1.10.1.1 Spatial distribution maps, generated using design-based estimates, for puffin throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-17 and Figure 1-18, respectively.



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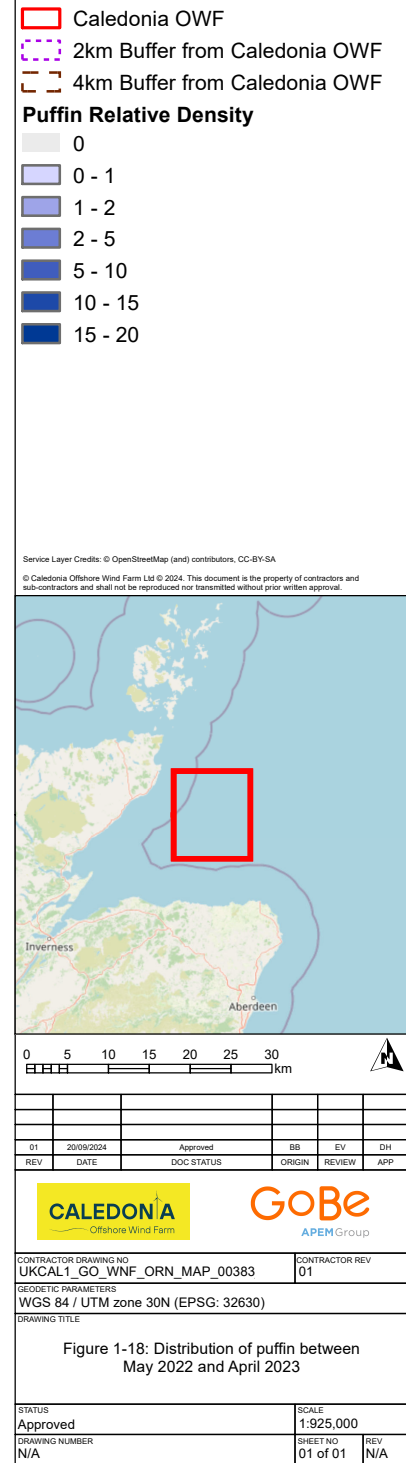
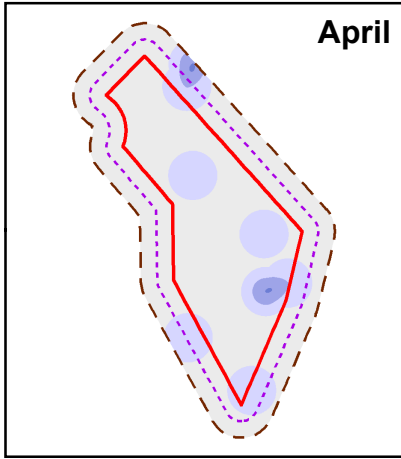
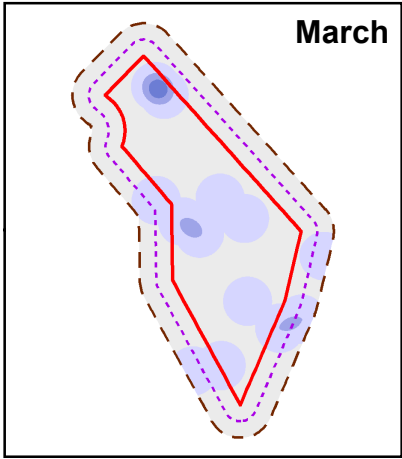
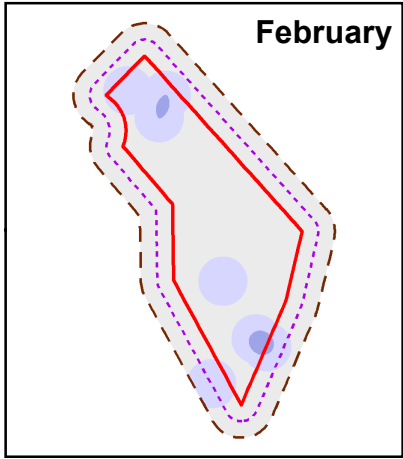
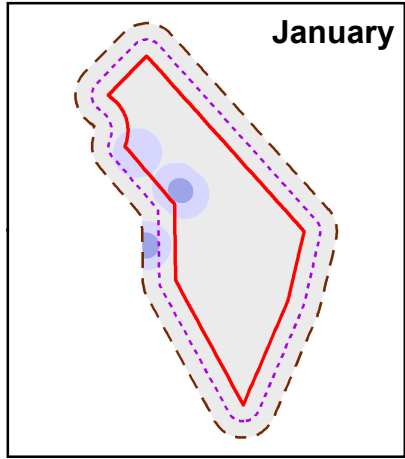
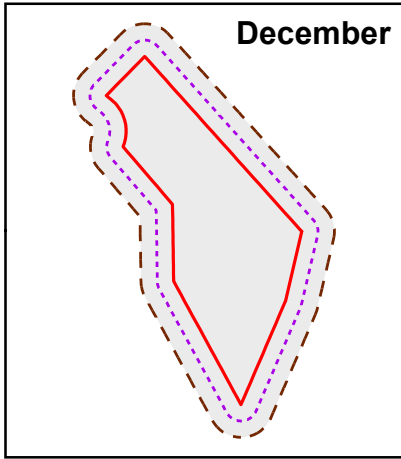
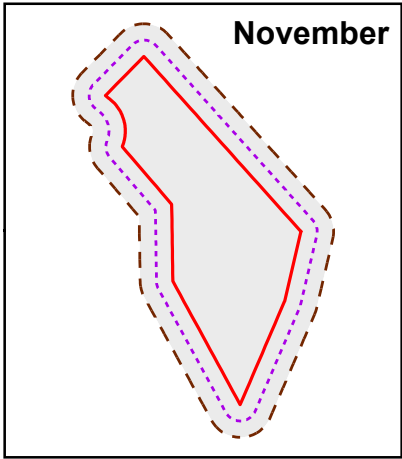
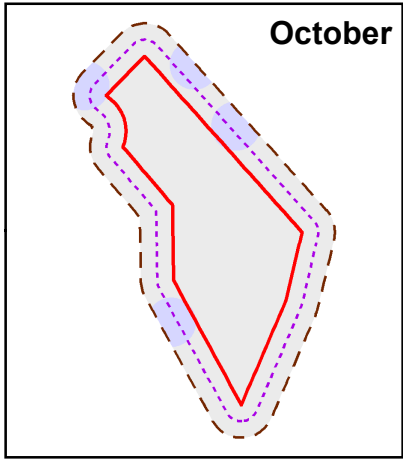
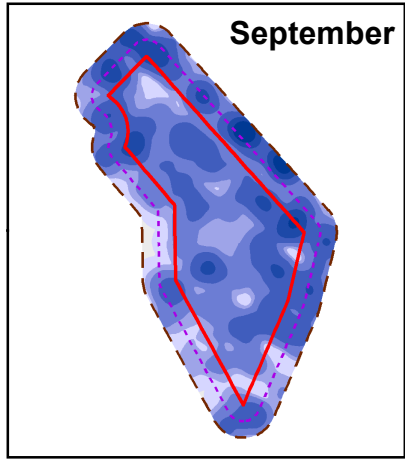
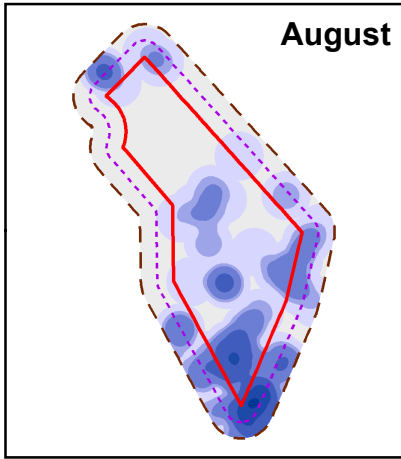
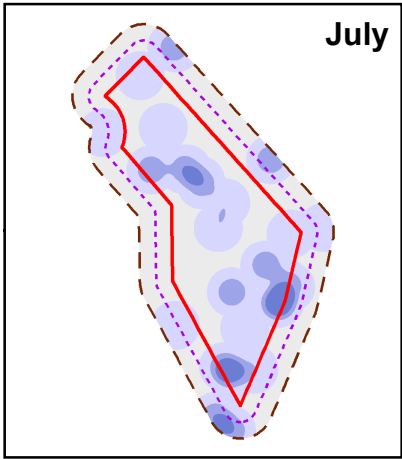
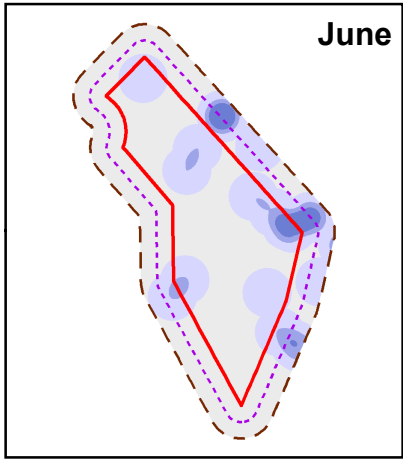
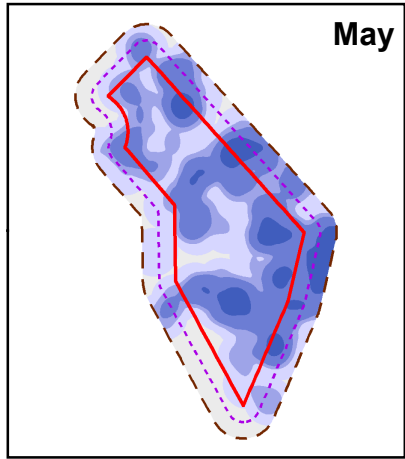
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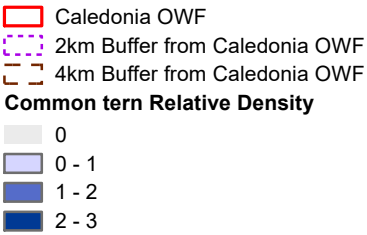
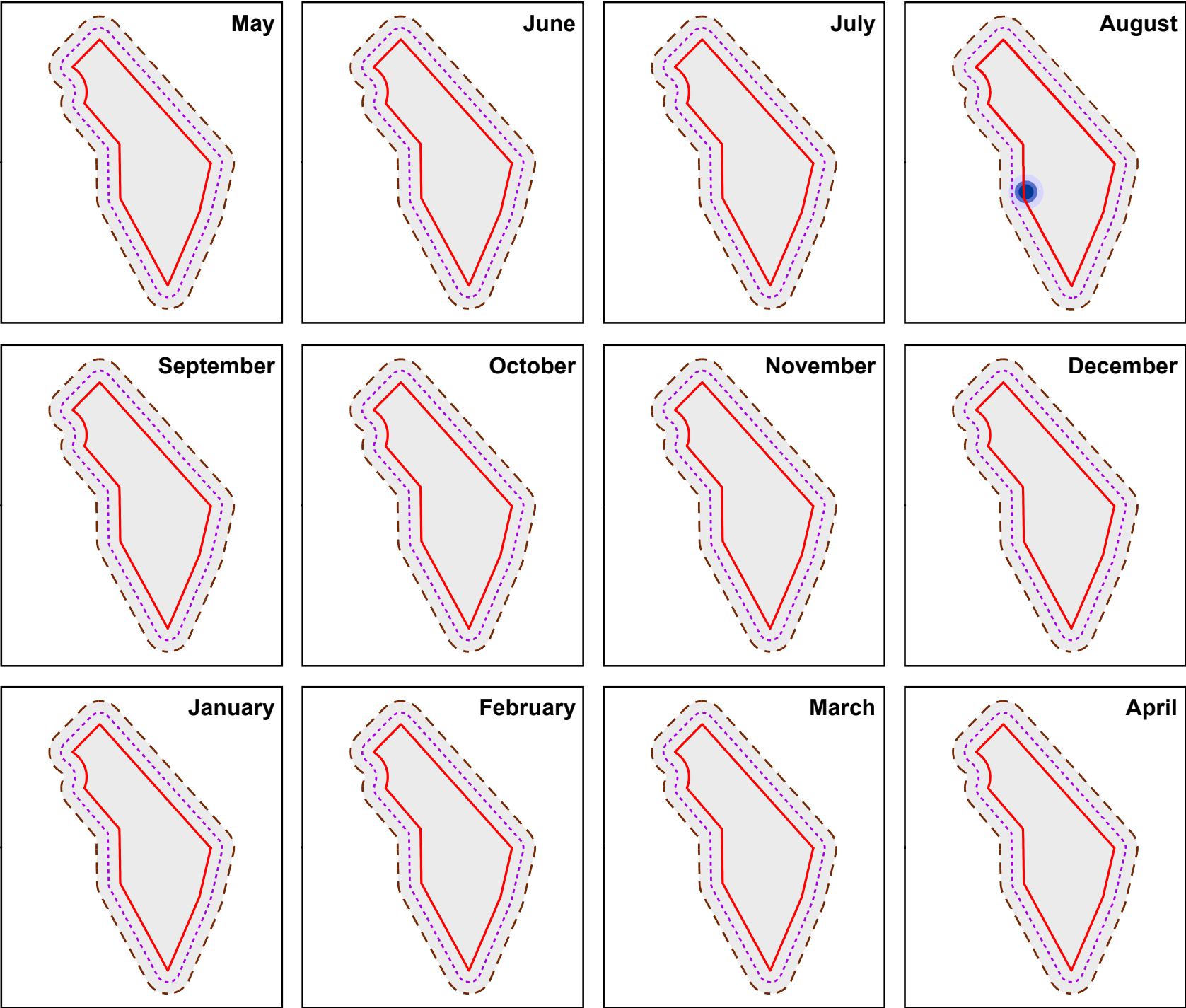
Figure 1-17: Distribution of puffin between May 2021 and April 2022

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N/A	01 of 01
	REV
	N/A

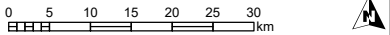


1.11 Common Tern



- 1.11.1.1 Spatial distribution maps, generated using design-based estimates, for common tern throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-19 and Figure 1-20, respectively.



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CONTRACTOR REV
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COORDINATE PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE
Figure 1-19: Distribution of common tern
between May 2021 and April 2022

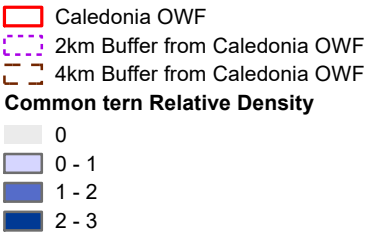
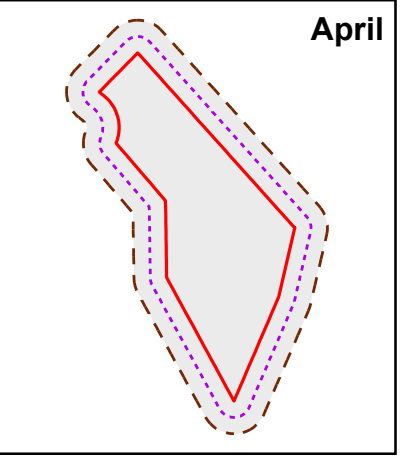
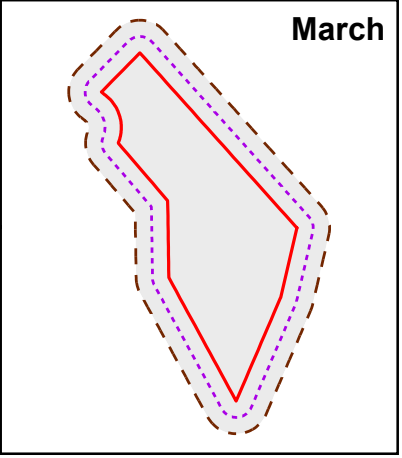
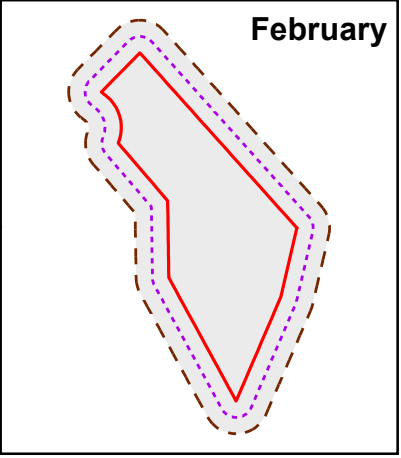
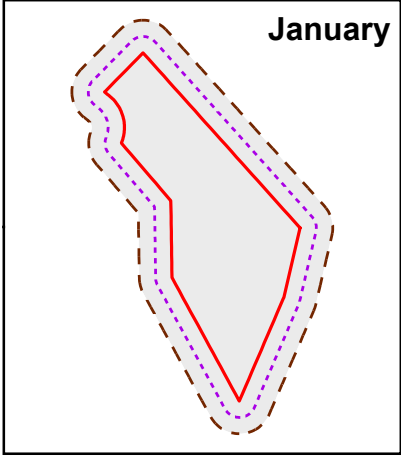
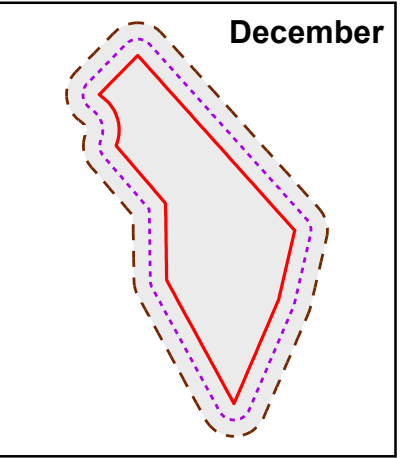
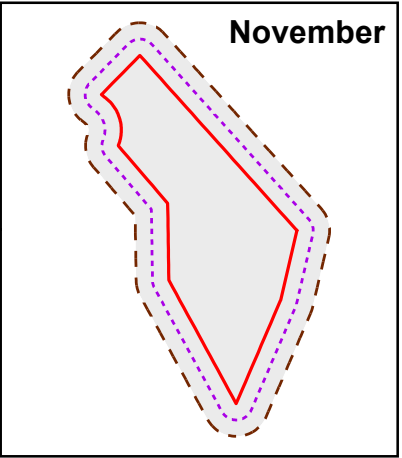
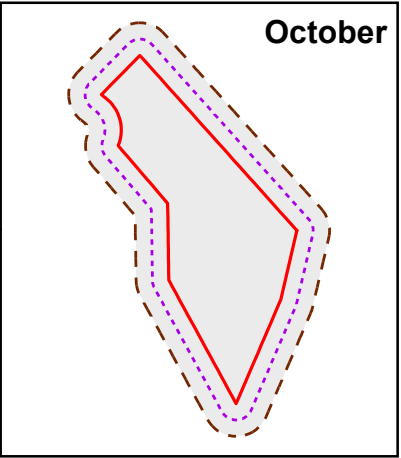
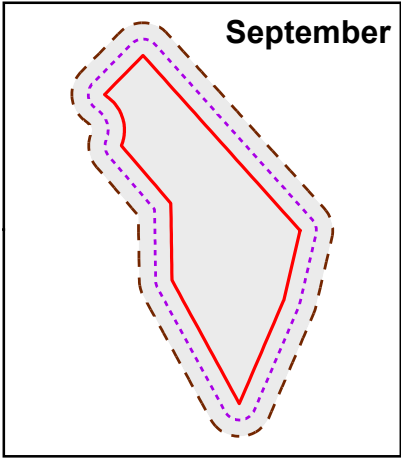
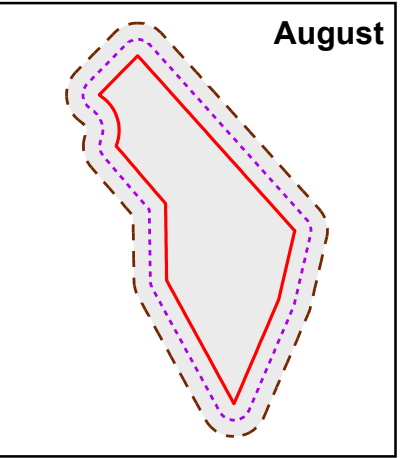
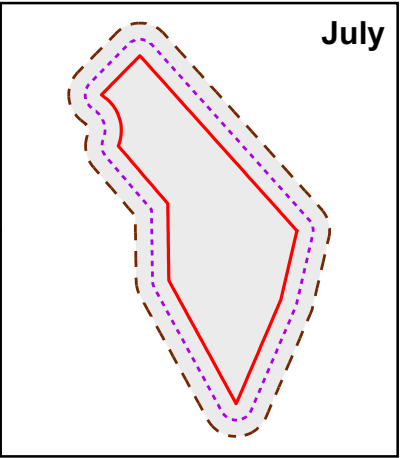
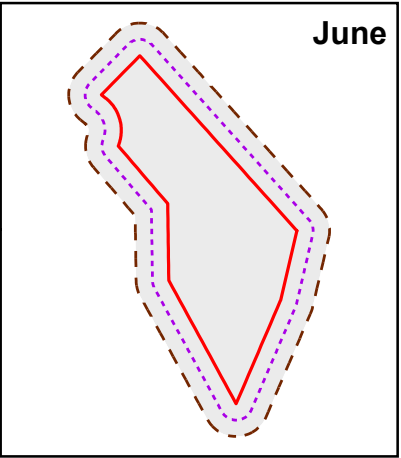
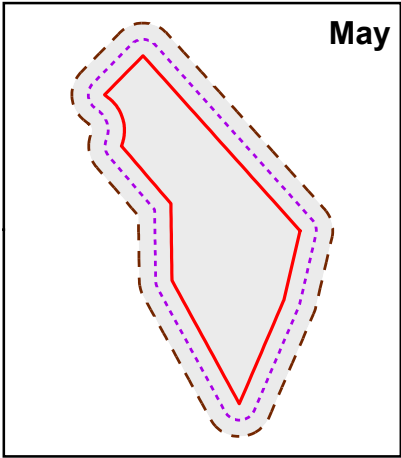
STATUS
Approved

SCALE
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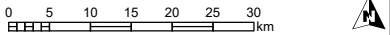
DRAWING NUMBER
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01 of 01

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N/A



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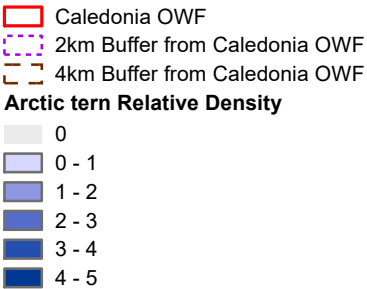
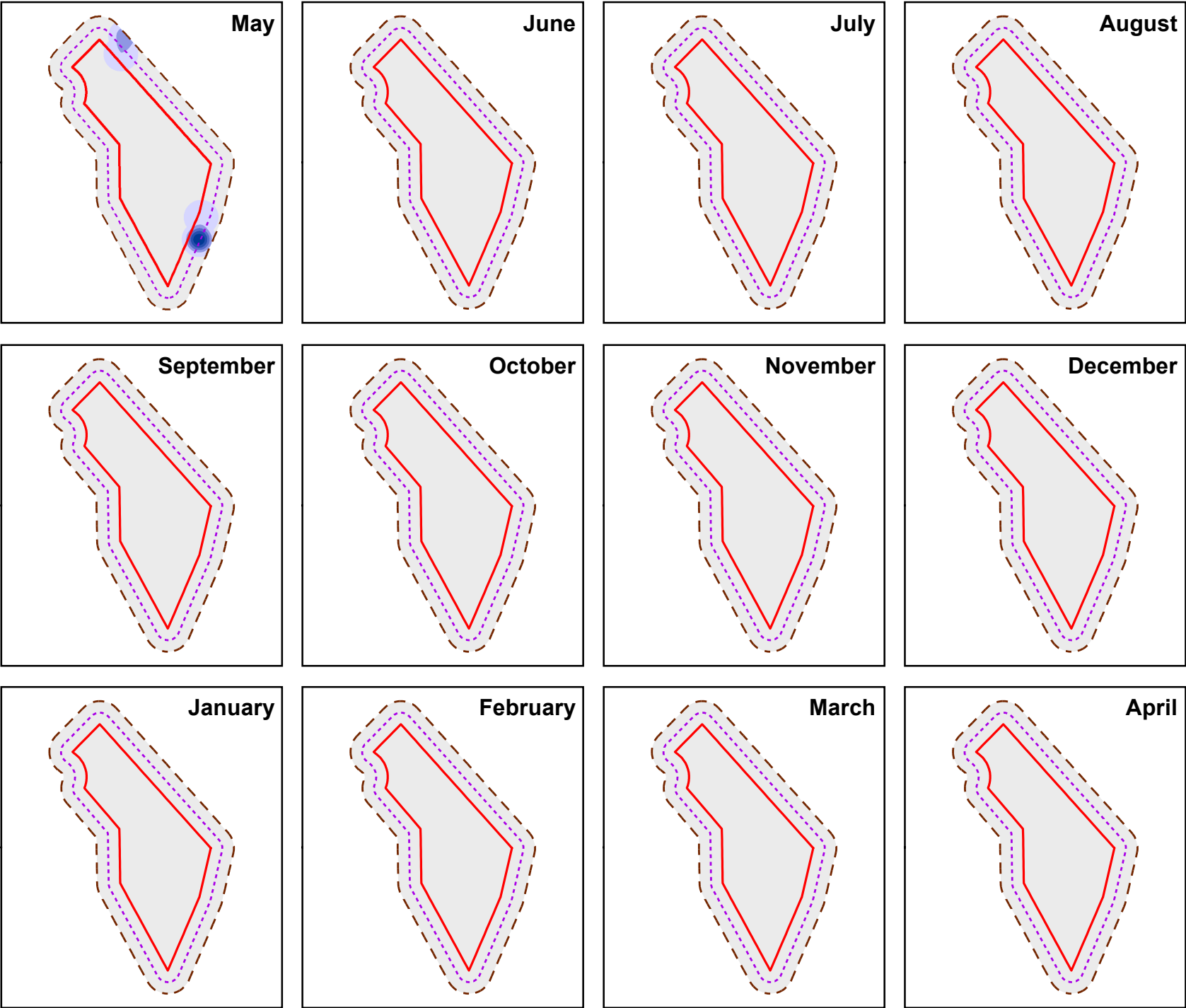
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GEOGRAPHIC PARAMETERS WGS 84 / UTM zone 30N (EPSG: 32630)	
DRAWING TITLE	

Figure 1-20: Distribution of common tern
between May 2022 and April 2023

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1.12 Arctic Tern

- 1.12.1.1 Spatial distribution maps, generated using design-based estimates, for Arctic tern throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-21 and Figure 1-22, respectively.

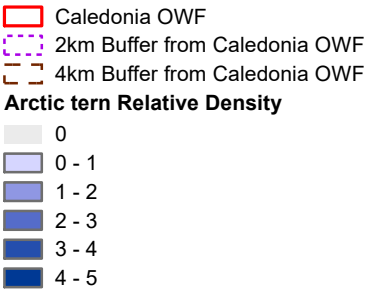
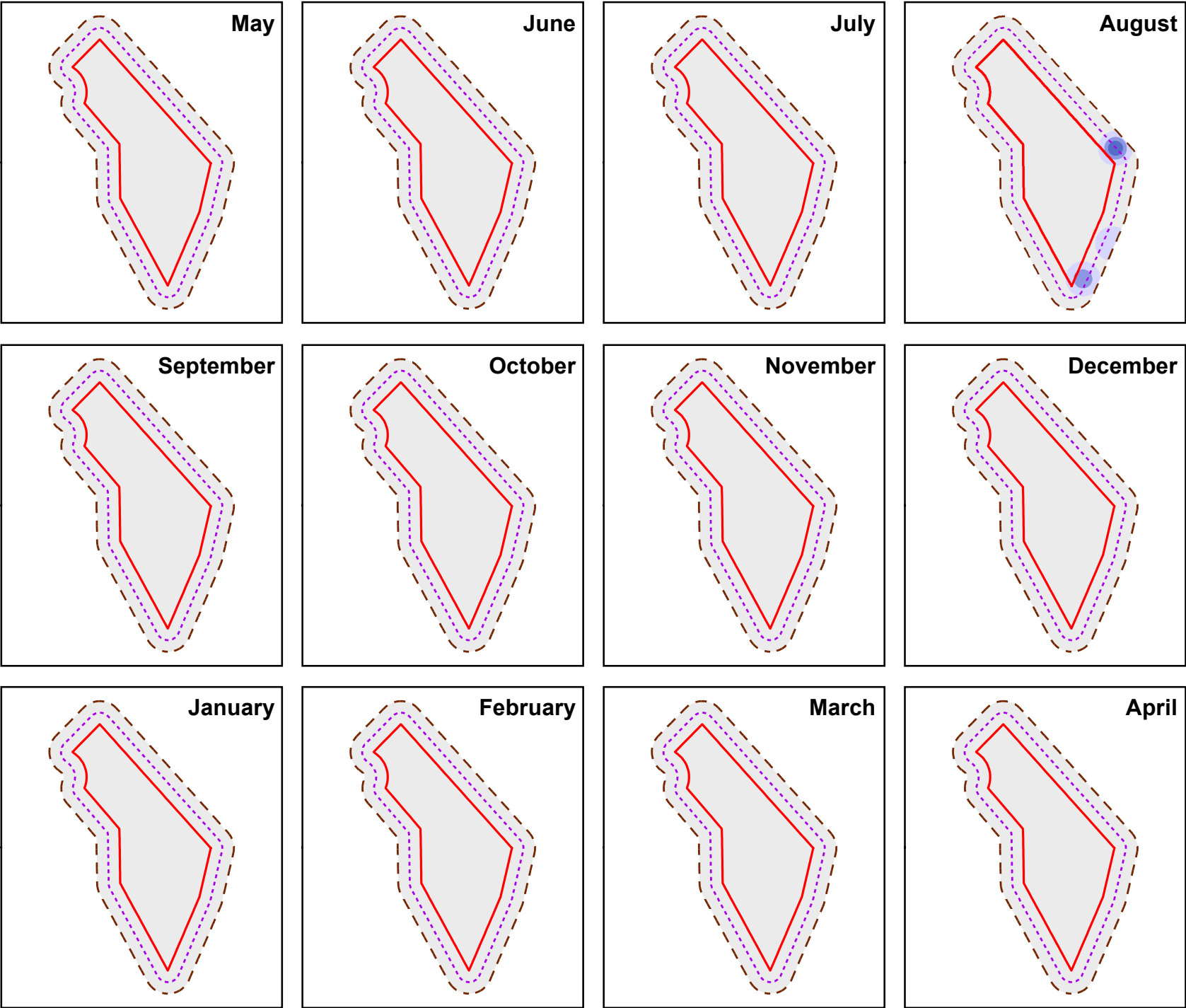


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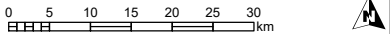
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CONTRACTOR DRAWING NO UKCAL1_GO_WNF_ORN_MAP_00394		CONTRACTOR REV 01	
GEOGRAPHIC PARAMETERS WGS 84 / UTM zone 30N (EPSG: 32630)			
DRAWING TITLE Figure 1-21: Distribution of arctic tern between May 2021 and April 2022			
STATUS Approved		SCALE 1:925,000	
DRAWING NUMBER N/A		SHEET NO 01 of 01	REV N/A



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CONTRACTOR REV: 01

COORDINATE PARAMETERS: WGS 84 / UTM zone 30N (EPSG: 32630)

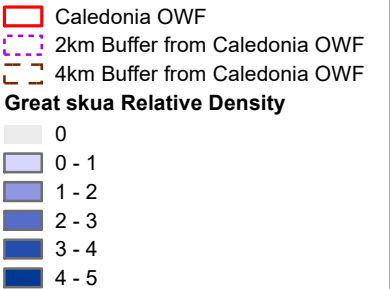
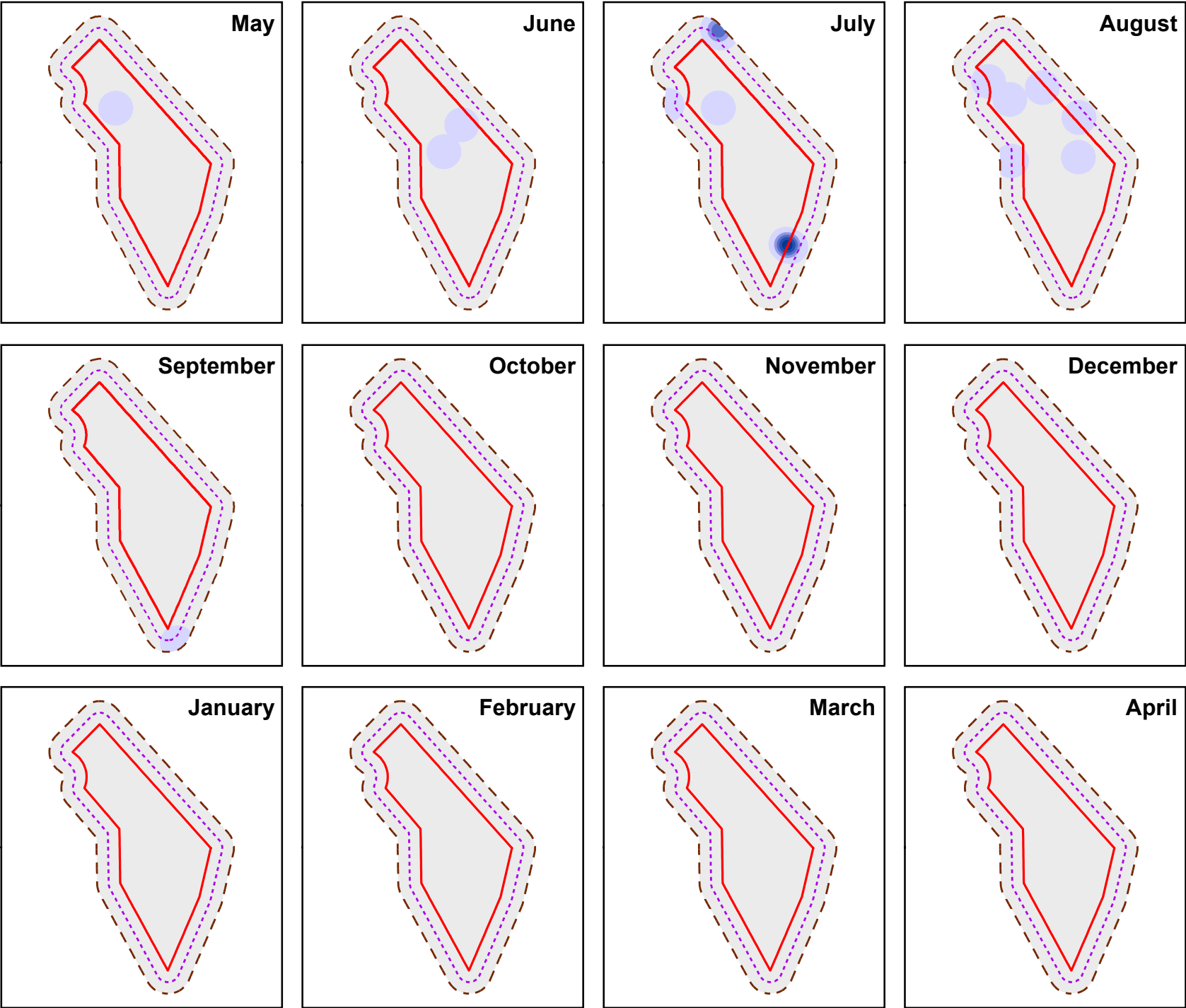
DRAWING TITLE

Figure 1-22: Distribution of arctic tern between May 2022 and April 2023

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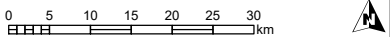
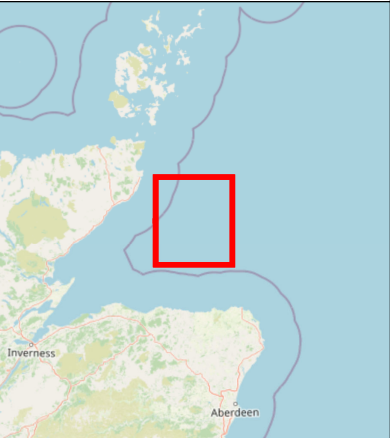
1.13 Great Skua

- 1.13.1.1 Spatial distribution maps, generated using design-based estimates, for great skua throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-23 and Figure 1-24, respectively.



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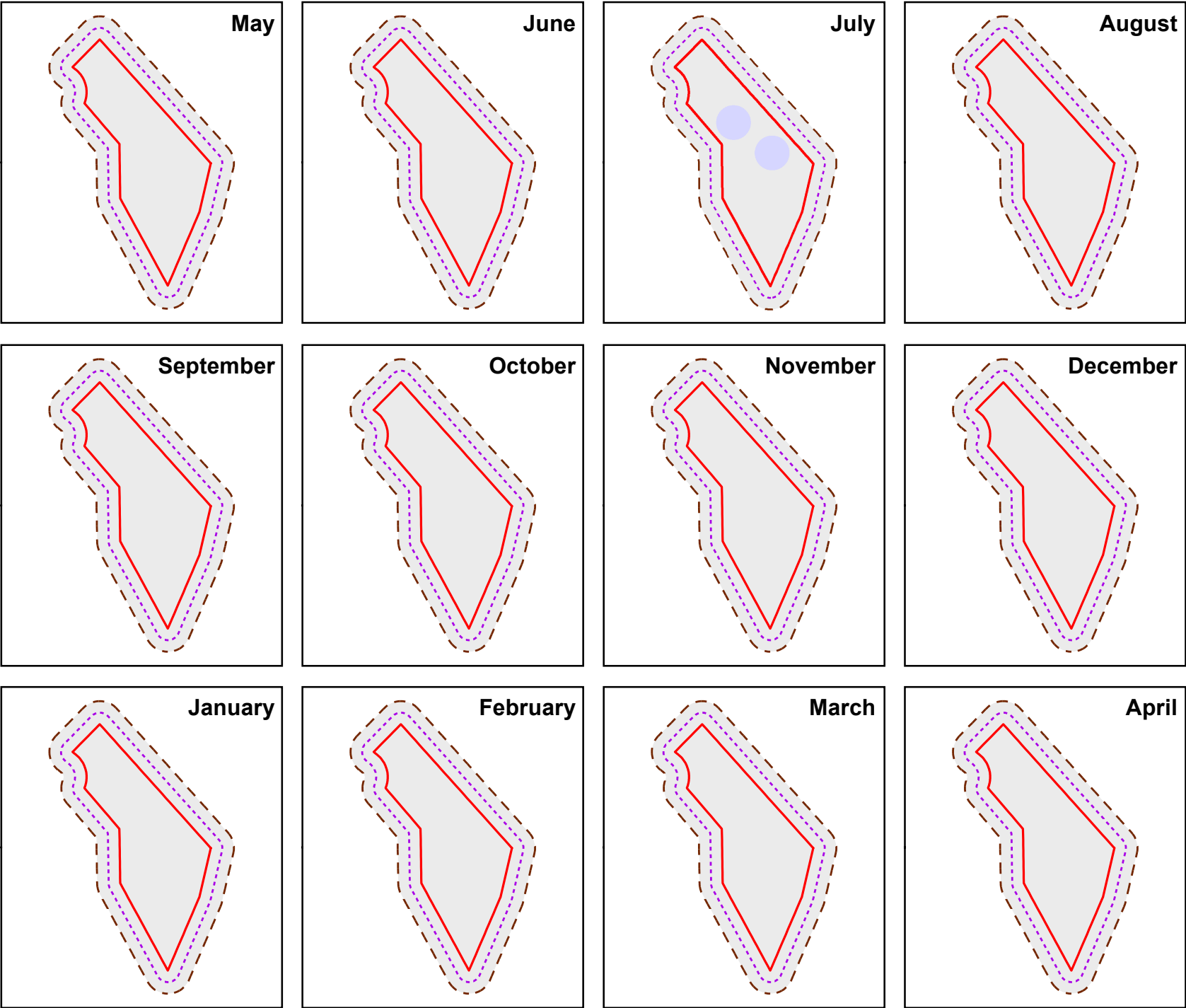
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CONTRACTOR DRAWING NO UKCAL1_GO_WNF_ORN_MAP_0040C	CONTRACTOR REV 01
GEOGRAPHIC PARAMETERS WGS 84 / UTM zone 30N (EPSG: 32630)	
DRAWING TITLE	

Figure 1-23: Distribution of great skua between May 2021 and April 2022

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	REV N/A



Caledonia OWF

2km Buffer from Caledonia OWF

4km Buffer from Caledonia OWF

Great skua Relative Density

0

0 - 1

1 - 2

2 - 3

3 - 4

4 - 5

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0 5 10 15 20 25 30

km

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DRAWING TITLE

Figure 1-24: Distribution of great skua between May 2022 and April 2023

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N/A

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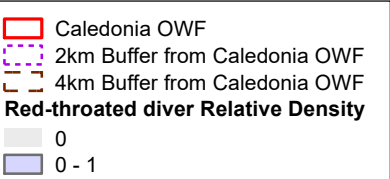
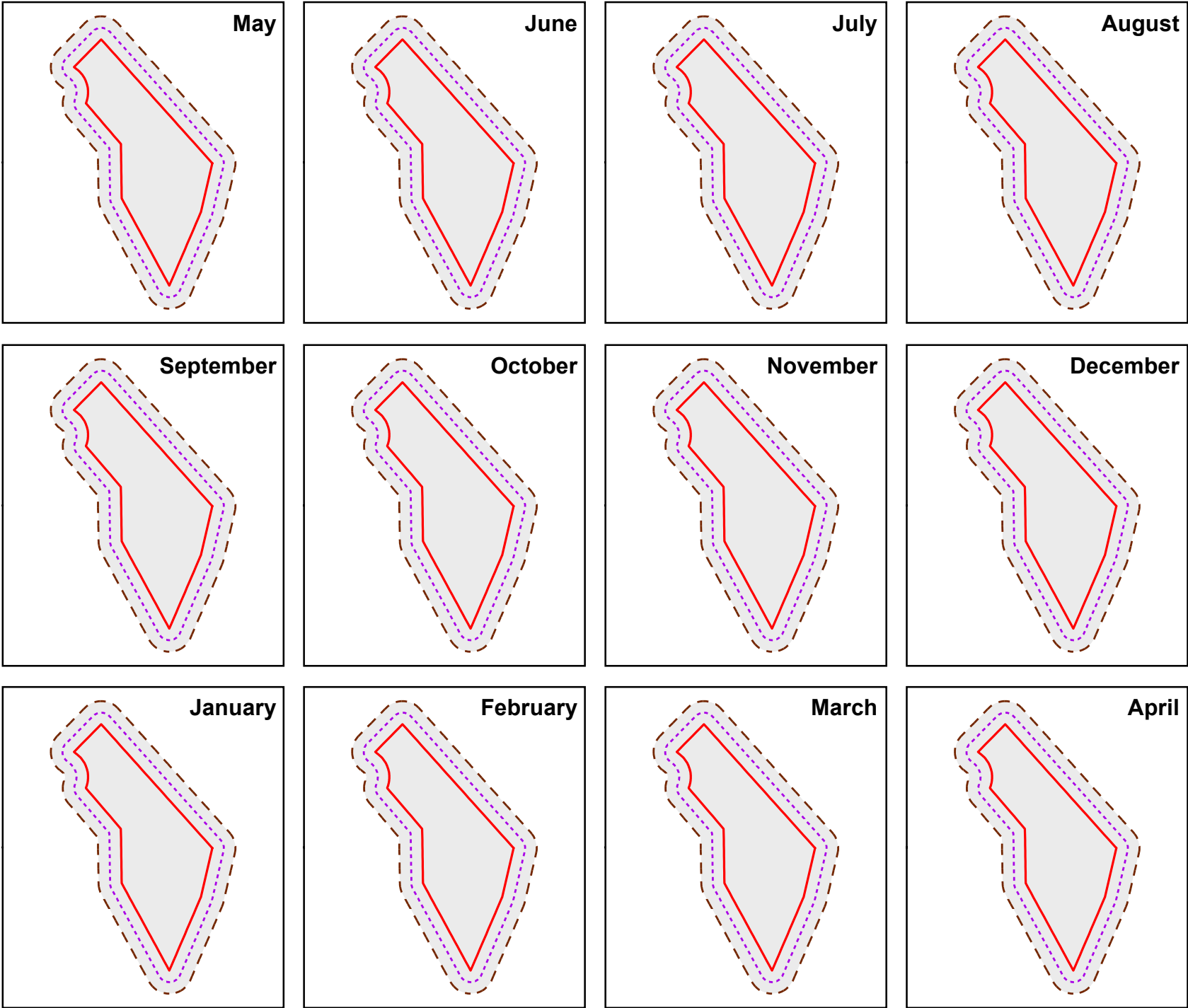
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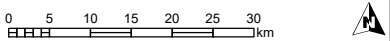
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1.14 Red-throated Diver

- 1.14.1.1 Spatial distribution maps, generated using design-based estimates, for red-throated diver throughout the Caledonia OWF (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-25 and Figure 1-26, respectively.



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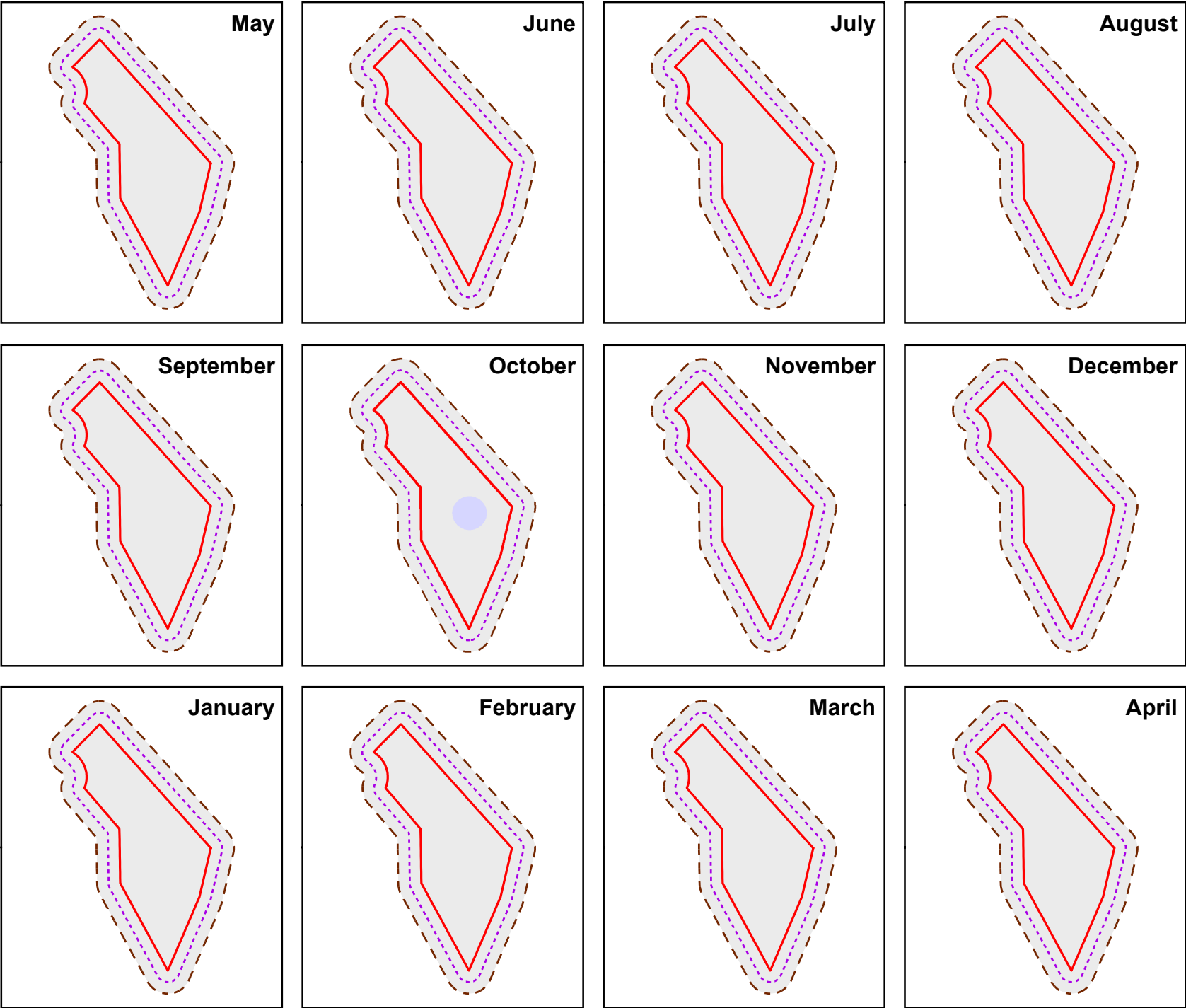
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CONTRACTOR REV: 01

GEOGRAPHIC PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE

Figure 1-25: Distribution of Red-throated diver between May 2021 and April 2022

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DRAWING NUMBER N/A	SHEET NO 01 of 01
	REV N/A



Caledonia OWF

2km Buffer from Caledonia OWF

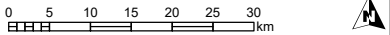
4km Buffer from Caledonia OWF

Red-throated diver Relative Density

0

0 - 1

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UKCAL1_GO_WNF_ORN_MAP_00407	01

GEOGRAPHIC PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE

Figure 1-26: Distribution of Red-throated diver between May 2022 and April 2023

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