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Volume 7B Proposed Development (Offshore) Appendices

Appendix 6-1 Offshore Ornithology Baseline Characterisation Report Annex 13 Spatial Distribution Figures (Caledonia North)

Caledonia Offshore Wind Farm Ltd

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Volume 7B Appendix 6-1 Annex 13 Spatial Distribution Figures (Caledonia North)

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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), specifically the Caledonia North Site, 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*.

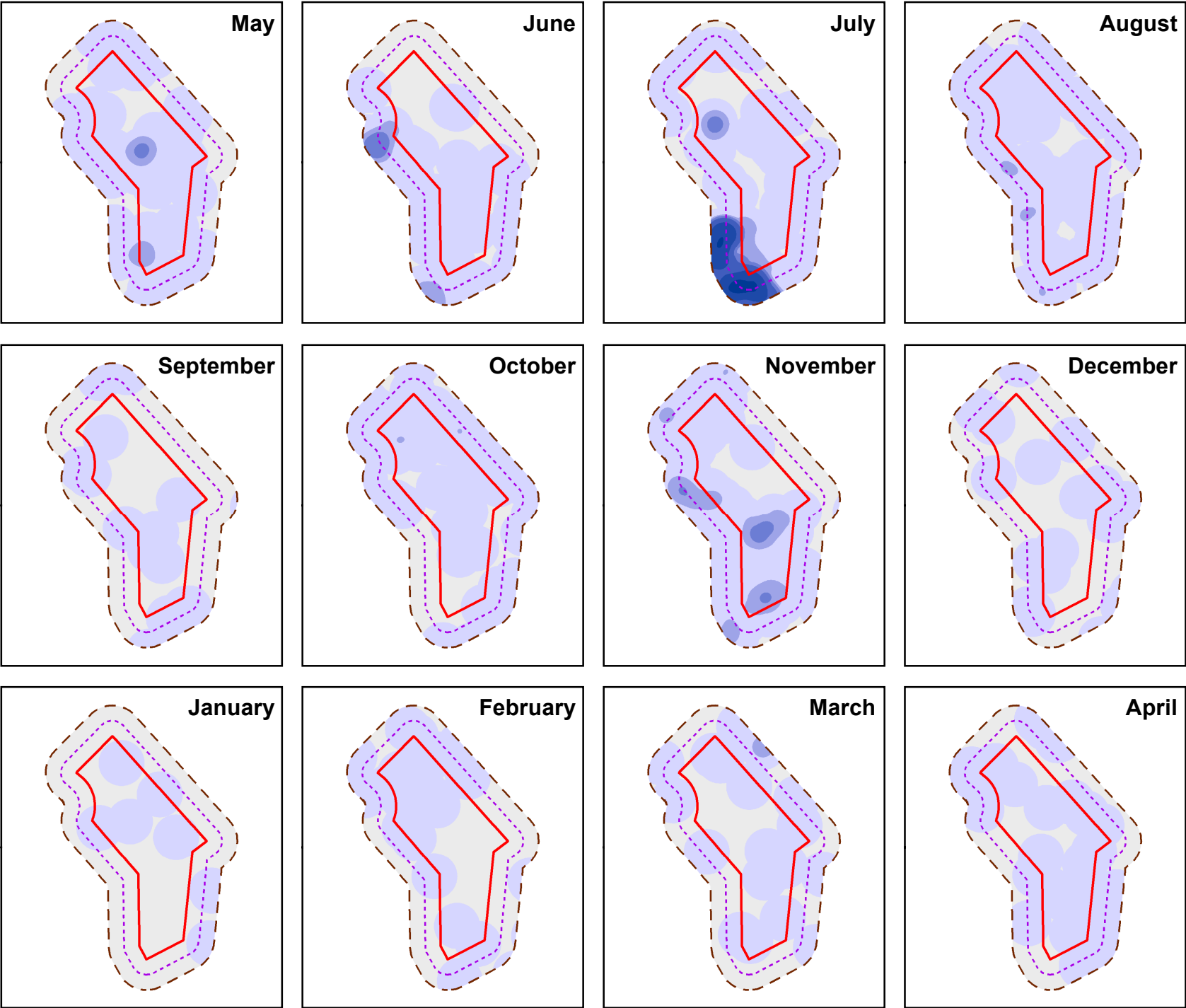
1.1.1.3 For the purposes of this report, the spatial distribution of seabirds within Caledonia North are presented in the form of heatmaps. The heatmaps present data on a monthly basis in order to account for species-specific spatial and temporal distributions for the purposes of defining the Caledonia North 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 3 km 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 North Site (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 North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Kittiwake Relative Density

0

0 - 5

5 - 10

10 - 20

20 - 50

50 - 100

100 - 220

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0

5

10

15

20

25

30

km

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COORDINATE PARAMETERS

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

DRAWING TITLE

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

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N/A

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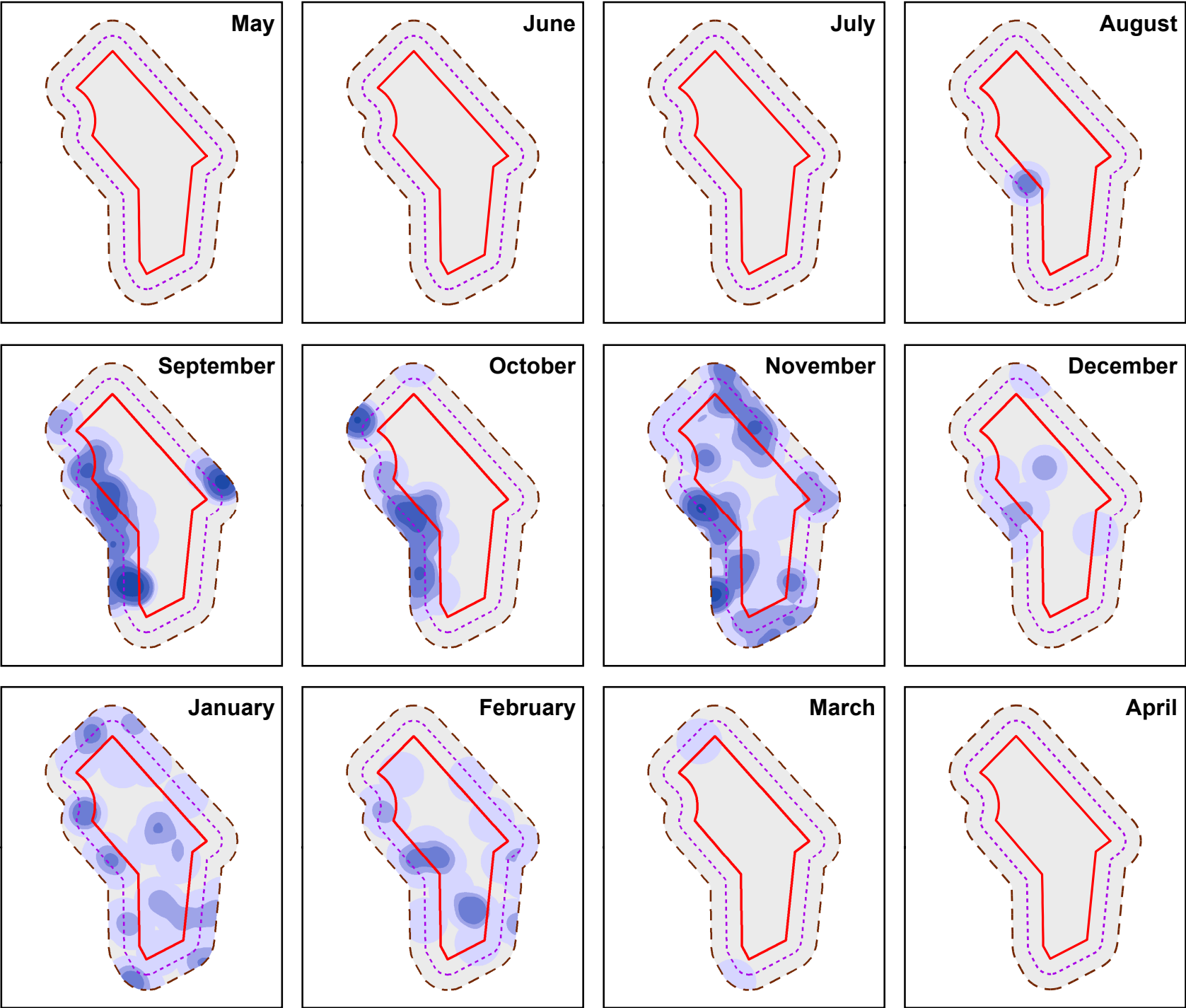
01 of 01

REV

N/A

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 North Site (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 North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

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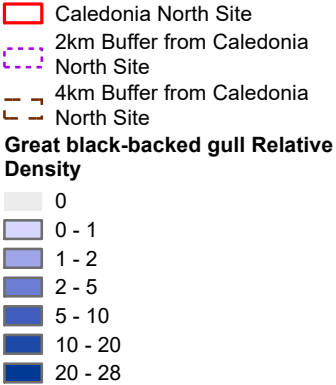
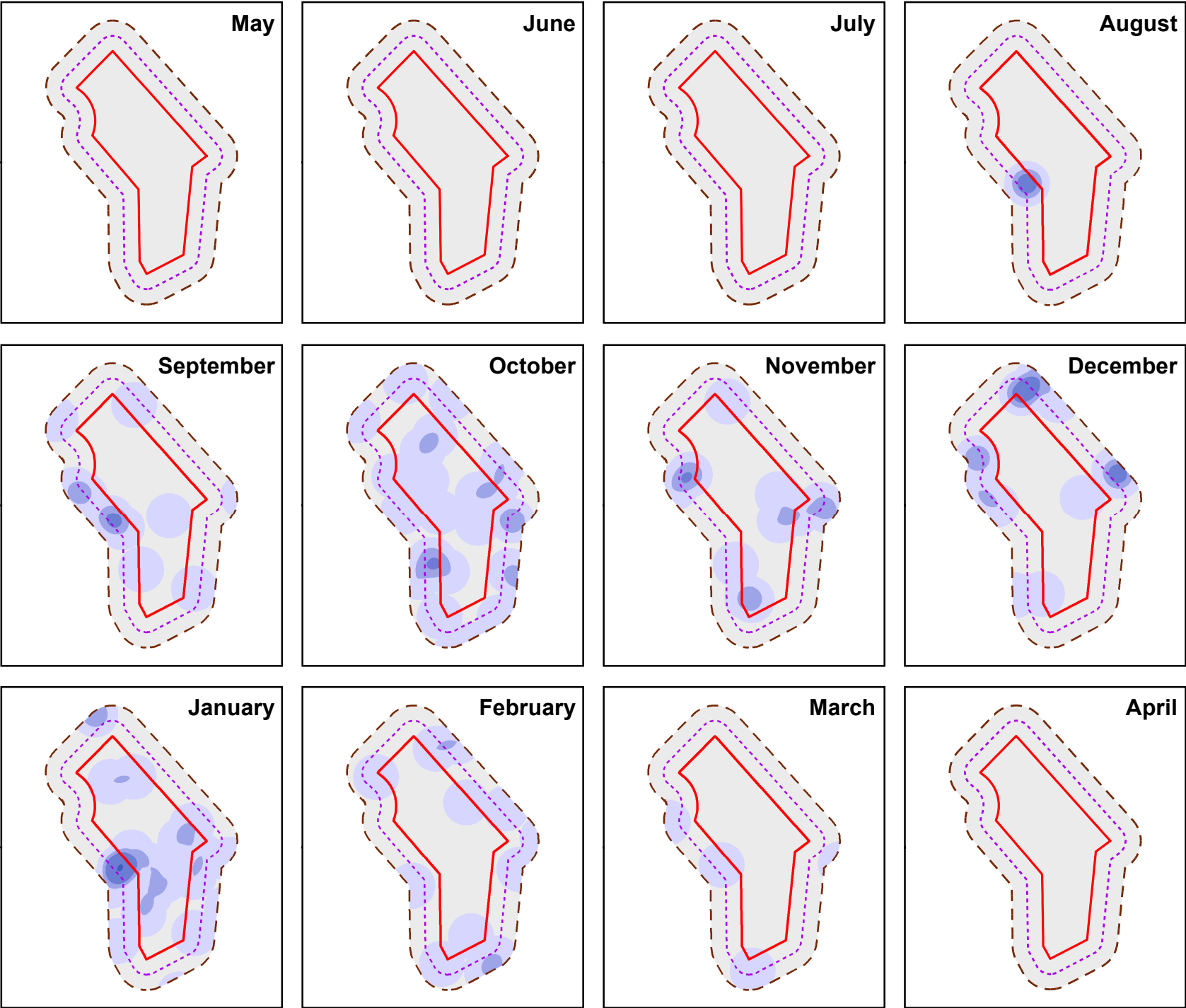
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WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE

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

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0 5 10 15 20 25 30 km

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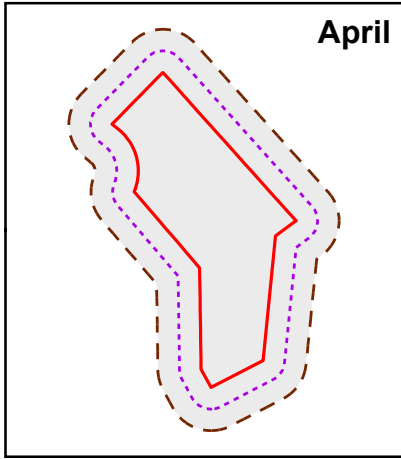
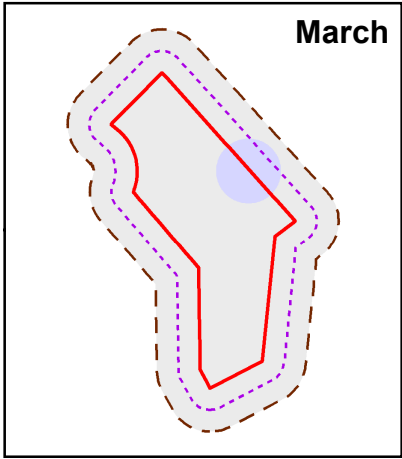
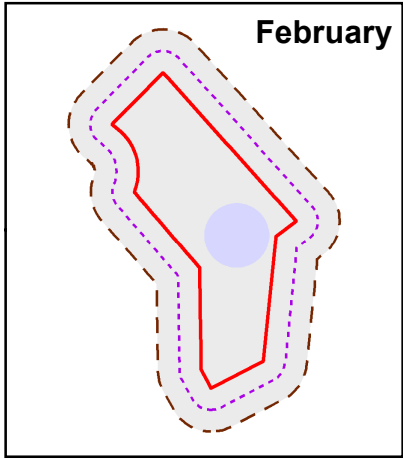
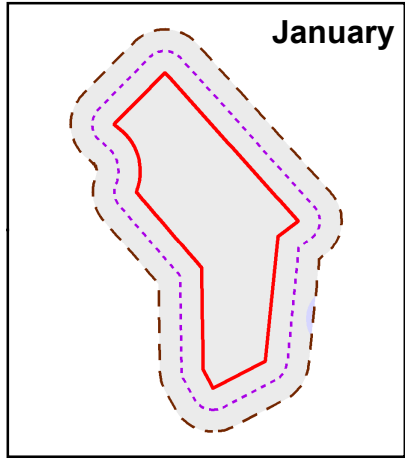
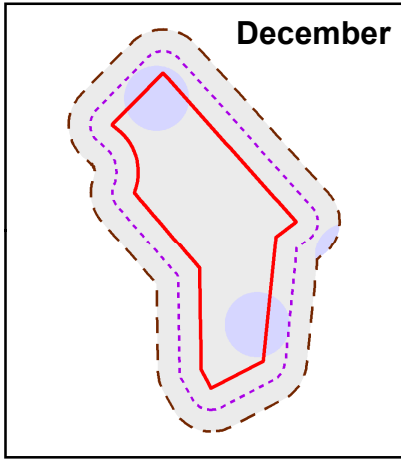
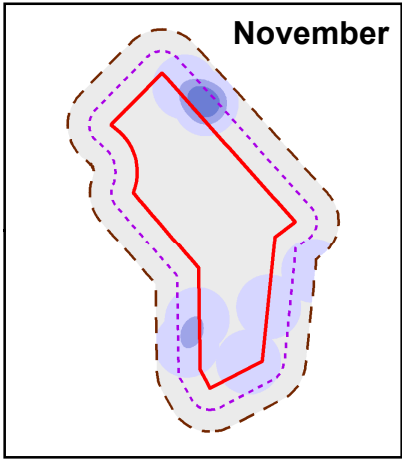
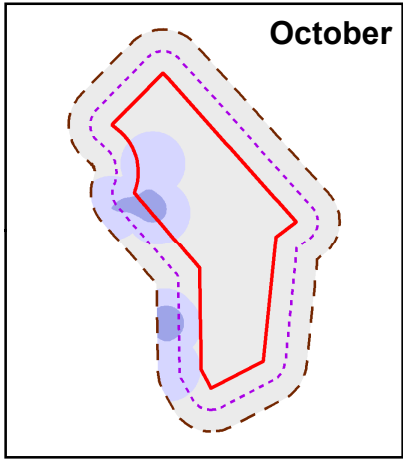
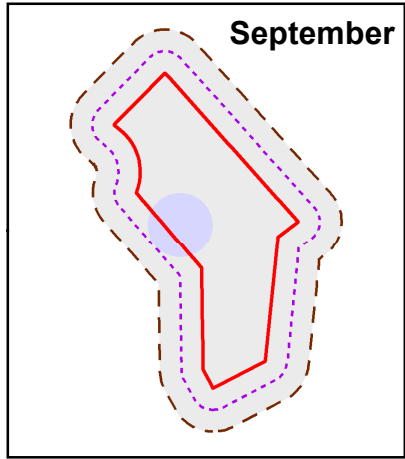
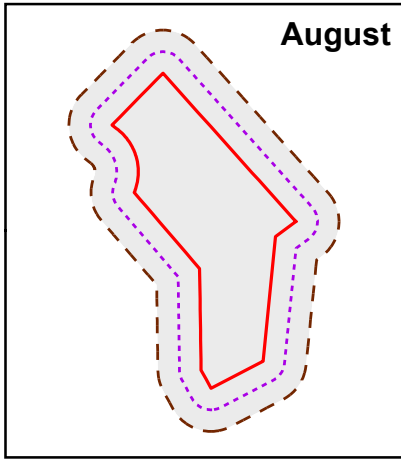
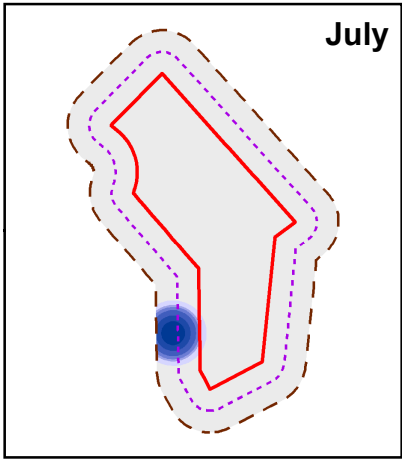
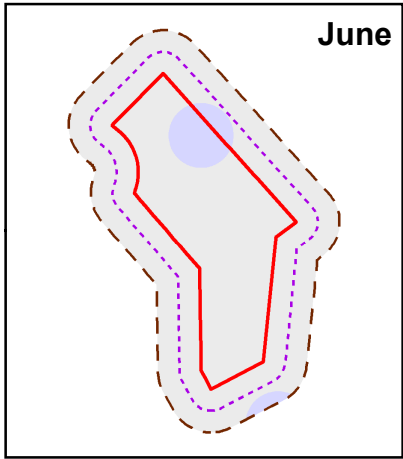
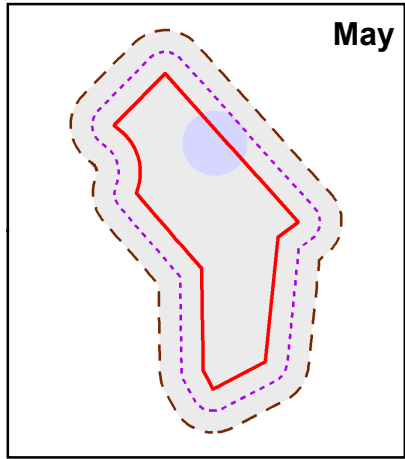
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1.4 Herring Gull

- 1.4.1.1 Spatial distribution maps, generated using design-based estimates, for herring gull throughout the Caledonia North Site (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.



Legend

- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Herring gull Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 4
- 4 - 8
- 8 - 12
- 12 - 16

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0 5 10 15 20 25 30 km

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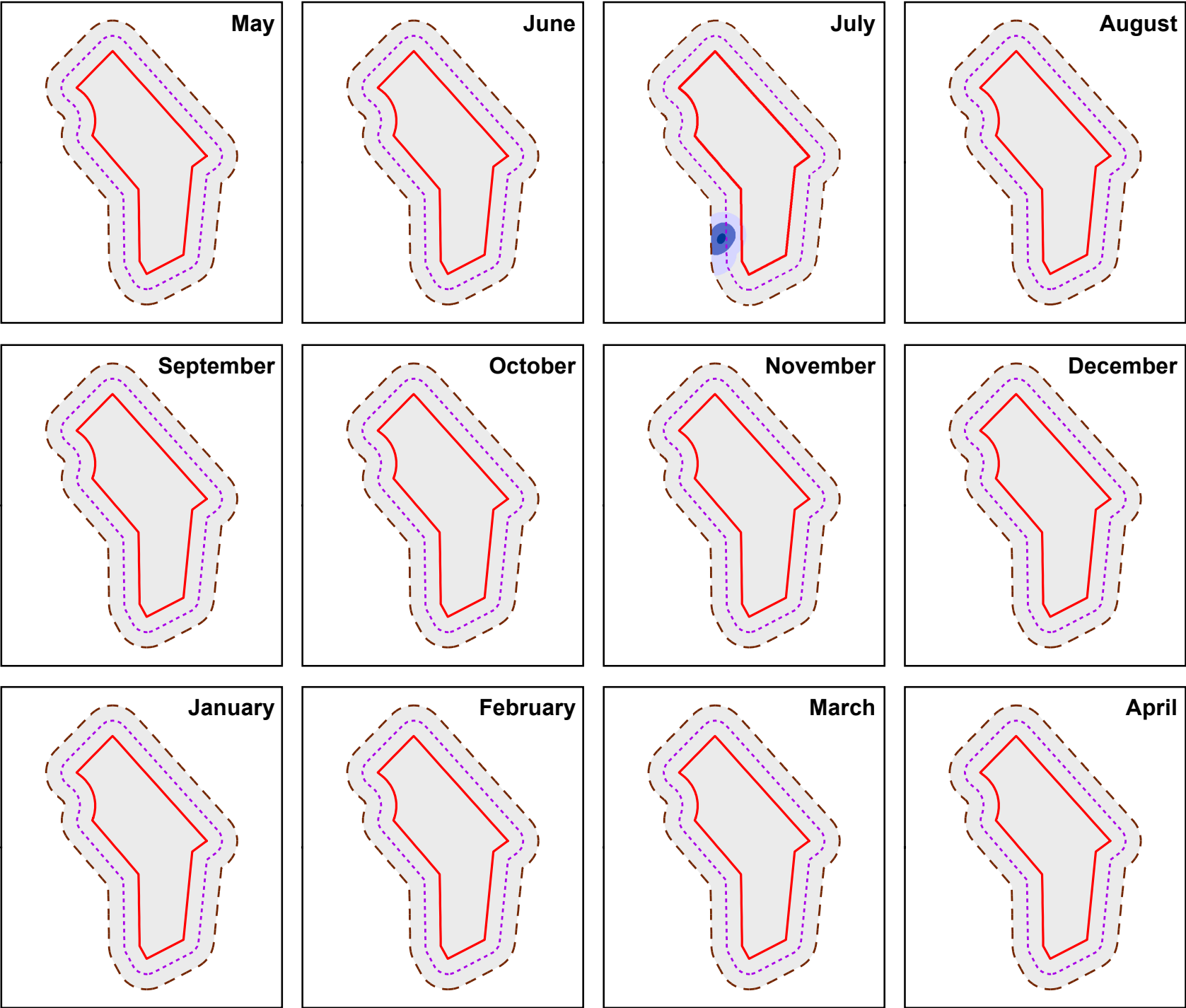
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Figure 1-5: Distribution of herring gull between May 2021 and April 2022

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REV: N/A

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 North Site (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.



Caledonia North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Lesser black-backed gull Relative Density

0

0 - 1

1 - 2

2 - 3

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05

0

5

10

15

20

25

30

km

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Figure 1-7: Distribution of lesser black-backed gull between May 2021 and April 2022

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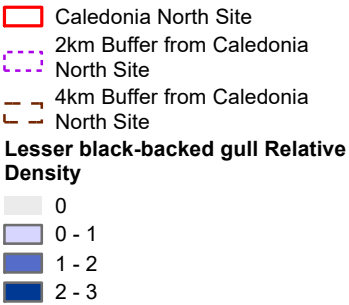
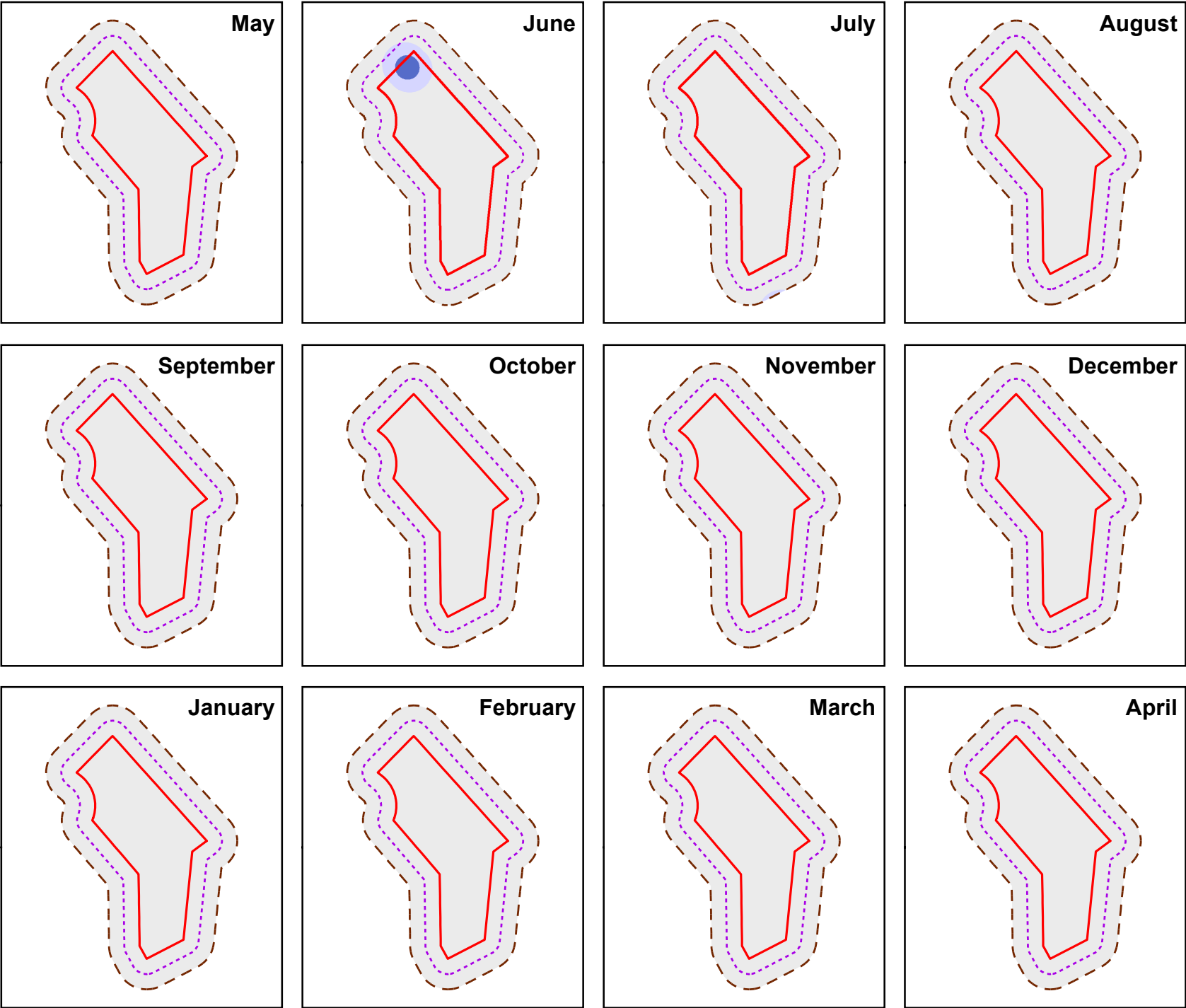
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0 5 10 15 20 25 30 km

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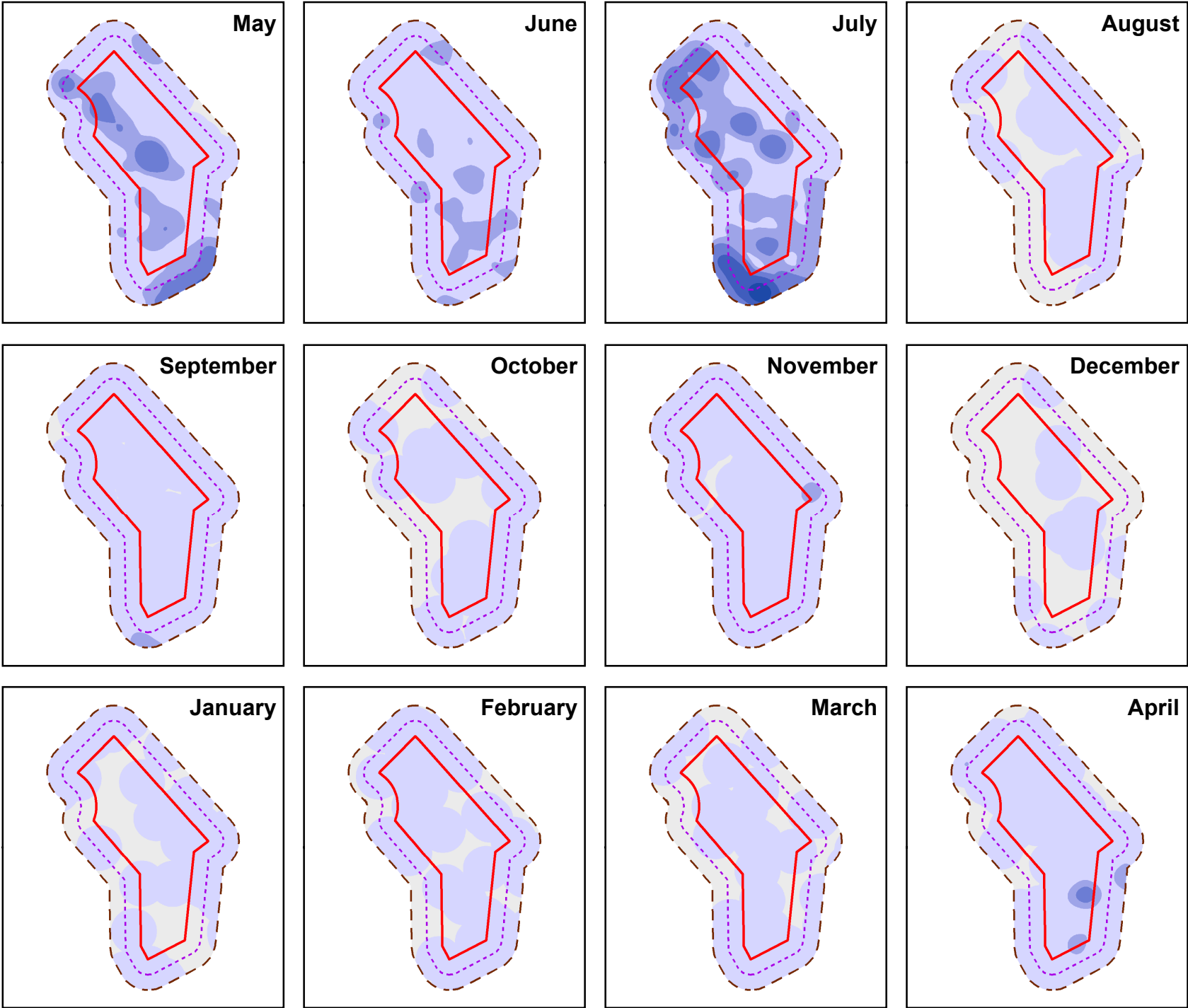
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Figure 1-8: Distribution of lesser black-backed gull between May 2022 and April 2023

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1.6 Guillemot

- 1.6.1.1 Spatial distribution maps, generated design-based estimates, for guillemot throughout the Caledonia North Site (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 North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Guillemot Relative Density

0

0 - 10

10 - 20

20 - 50

50 - 100

100 - 250

250 - 715

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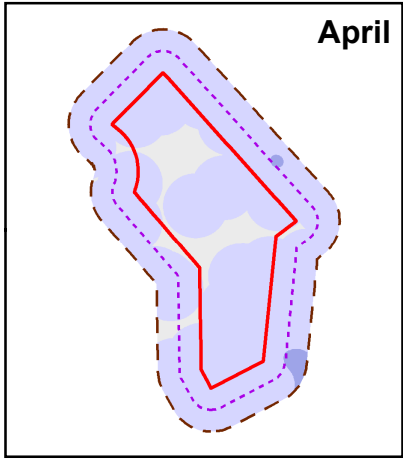
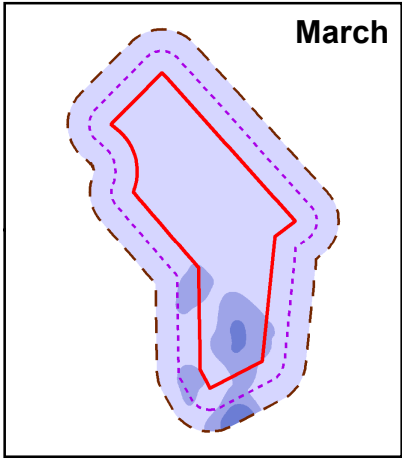
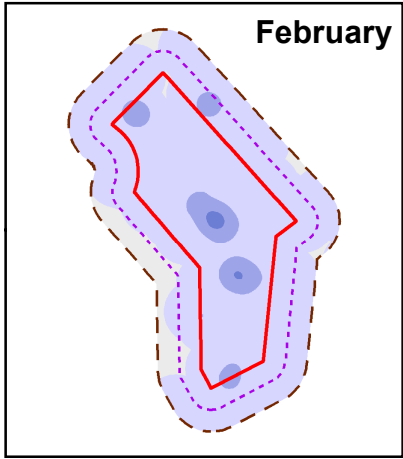
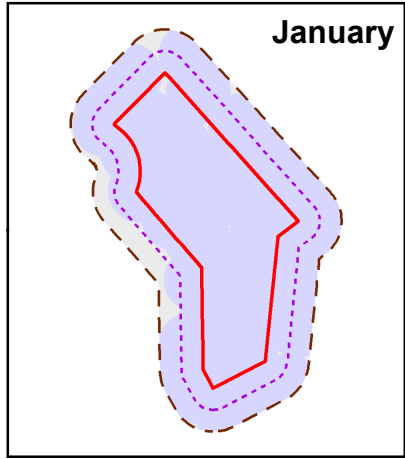
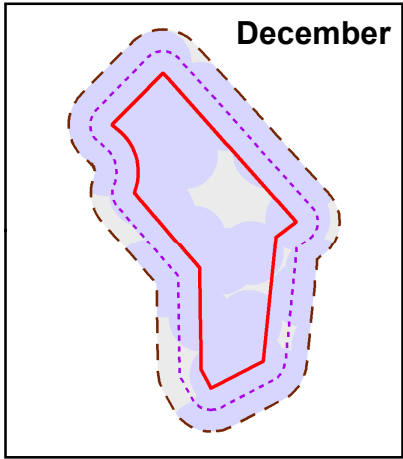
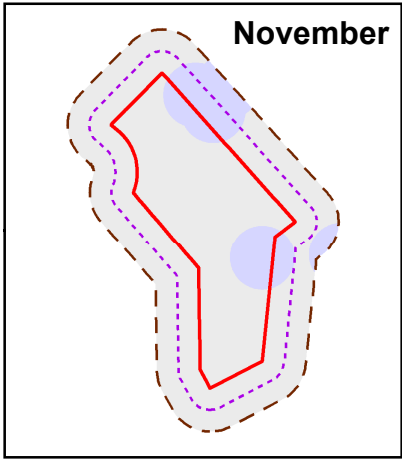
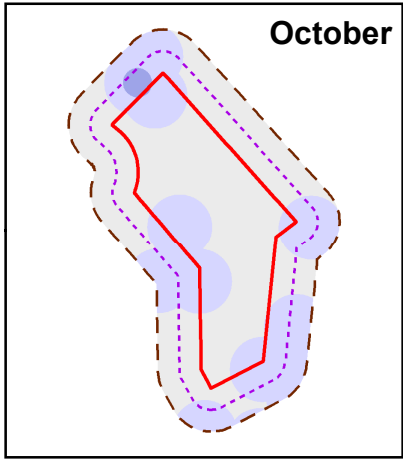
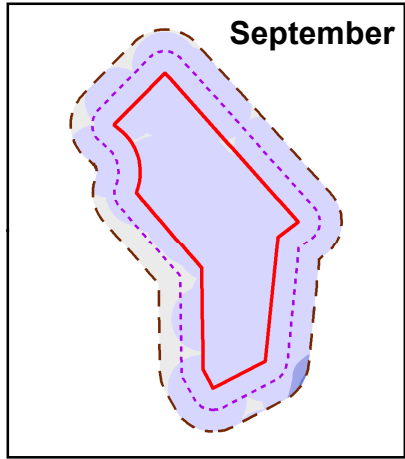
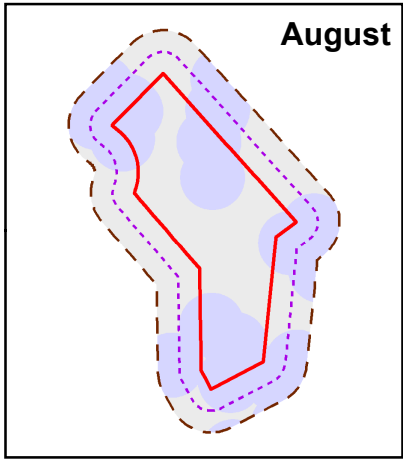
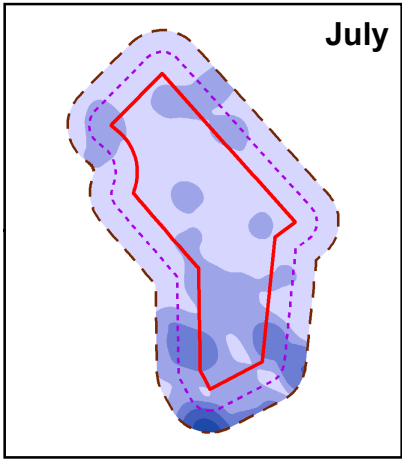
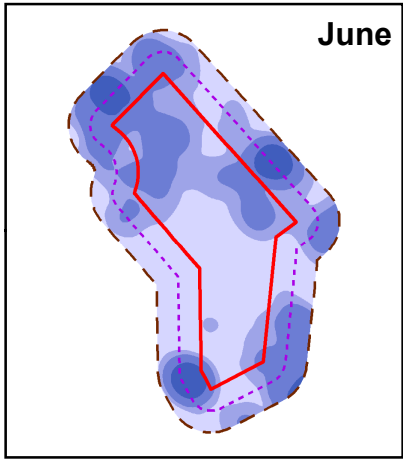
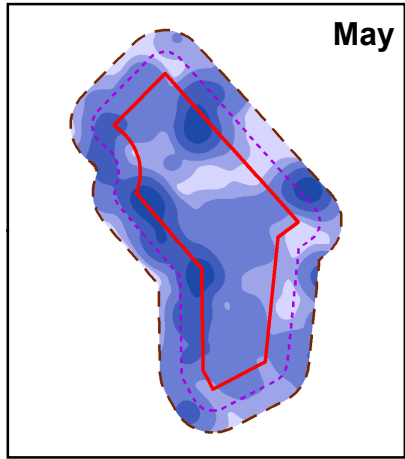
COORDINATE PARAMETERS

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

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Figure 1-9: Distribution of guillemot between May 2021 and April 2022

STATUS	Approved	SCALE	1:700,000
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Legend

- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Guillemot Relative Density

- 0
- 0 - 10
- 10 - 20
- 20 - 50
- 50 - 100
- 100 - 250
- 250 - 715

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0 5 10 15 20 25 30 km

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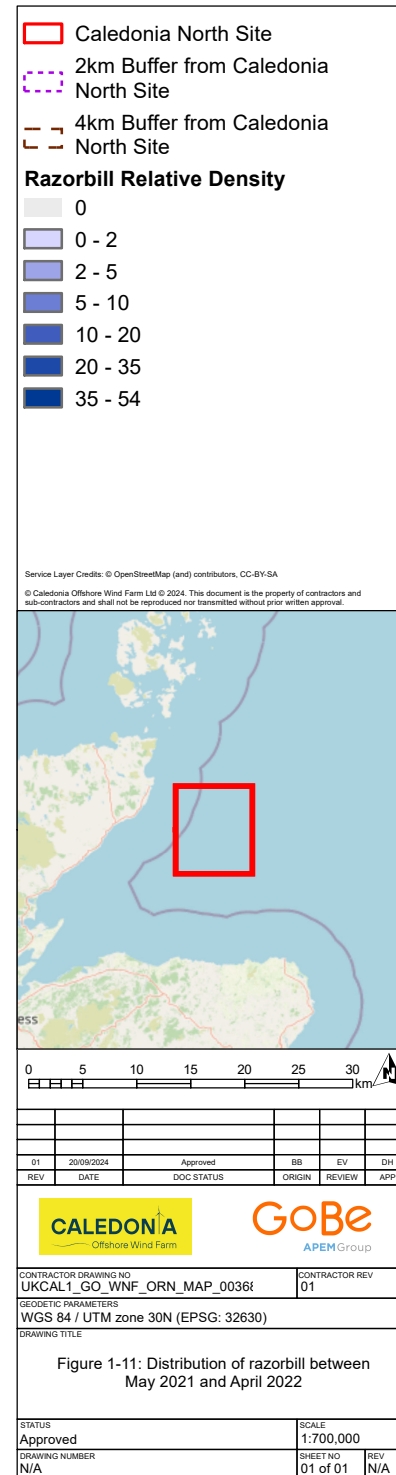
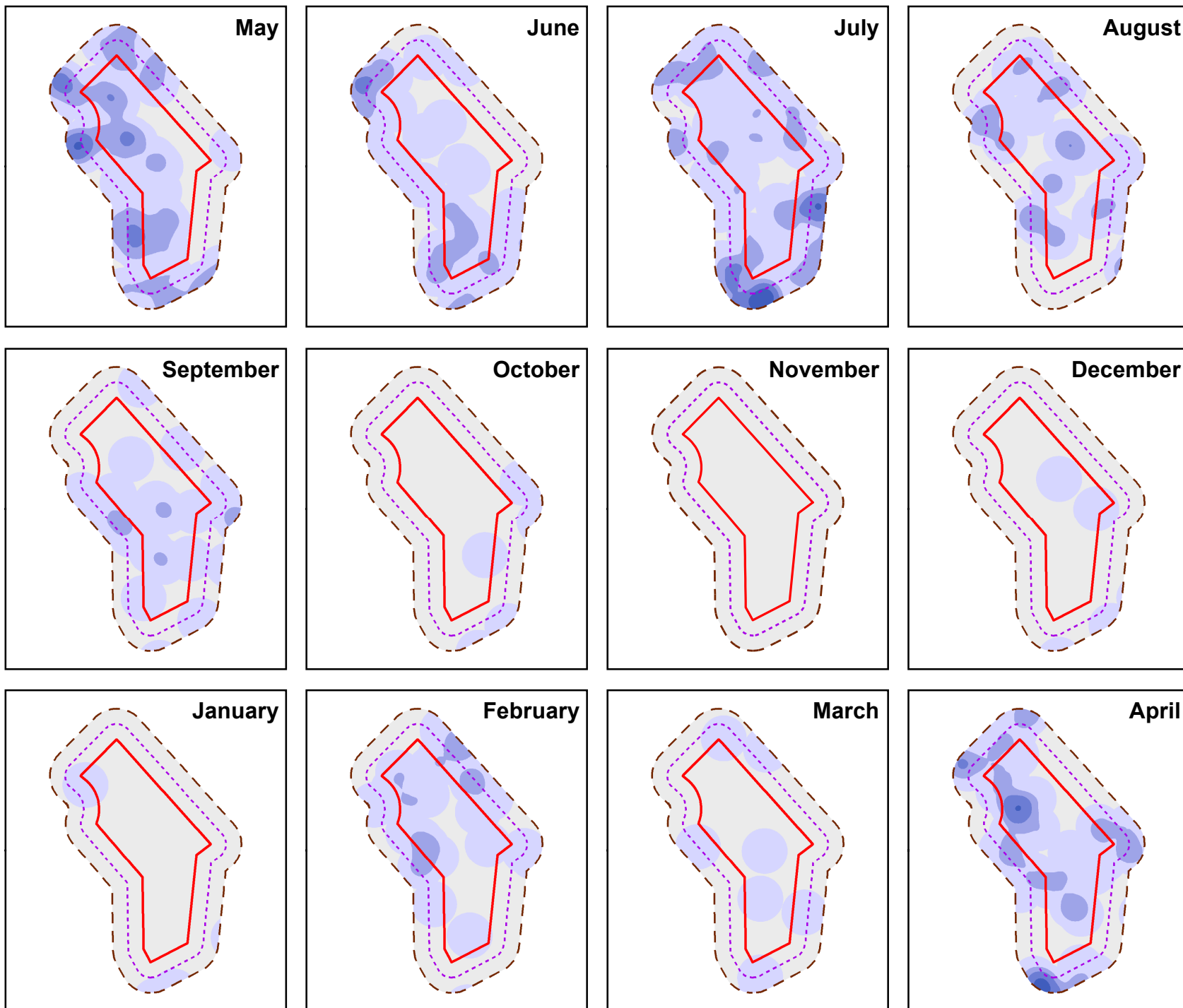
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Figure 1-10: Distribution of guillemot between May 2022 and April 2023

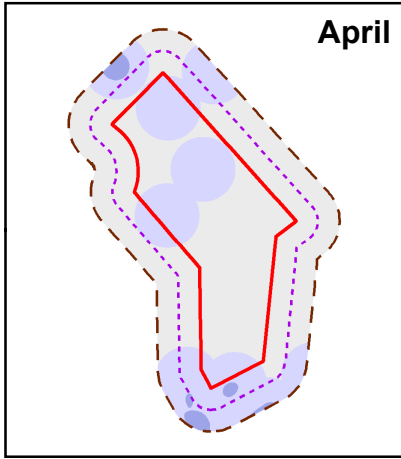
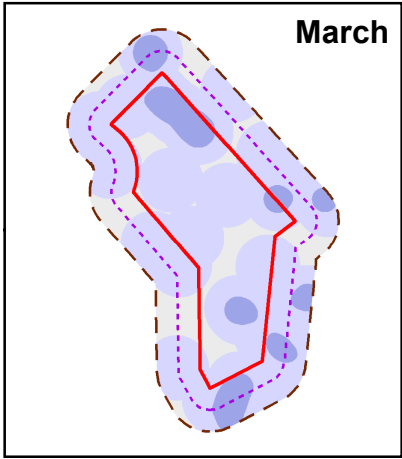
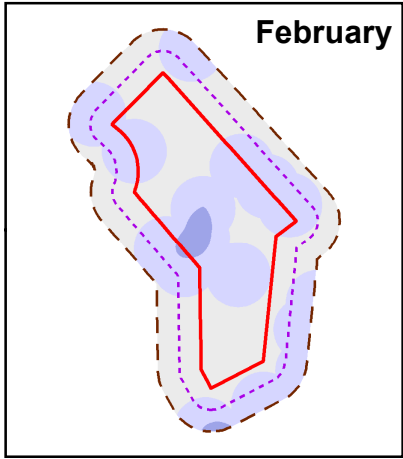
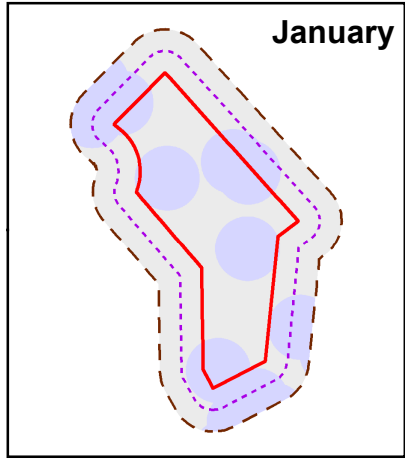
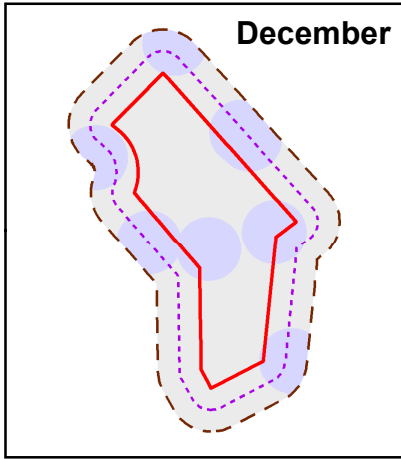
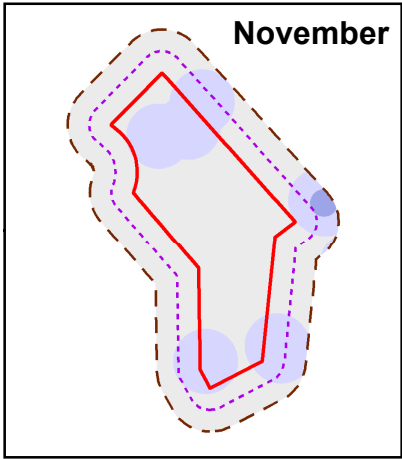
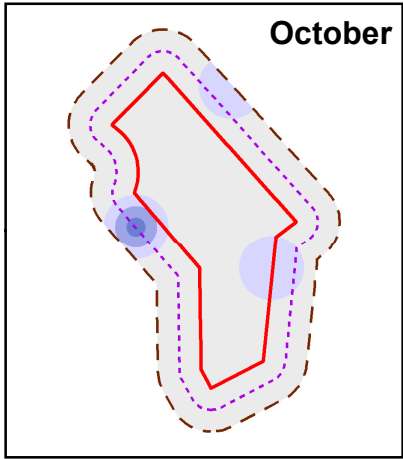
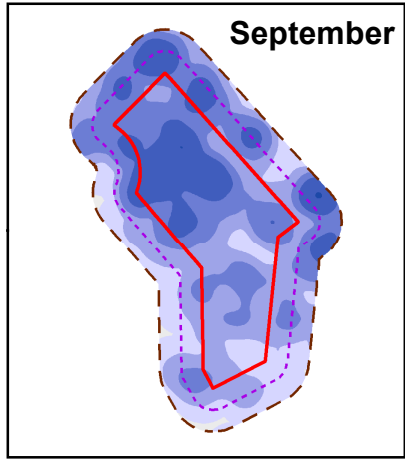
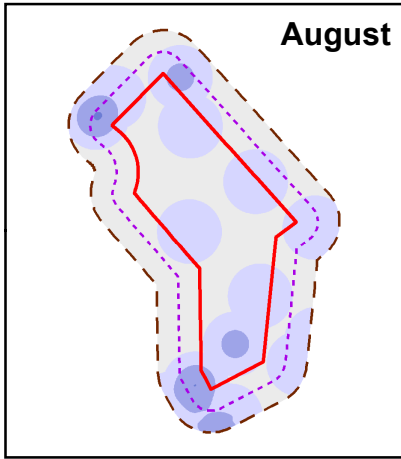
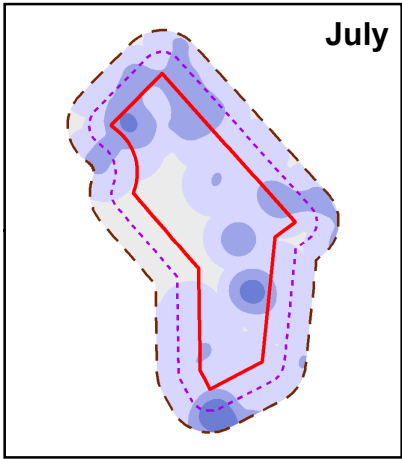
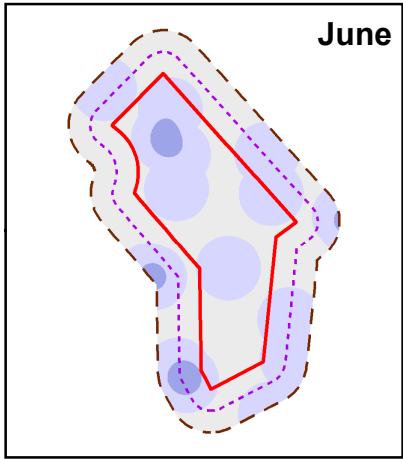
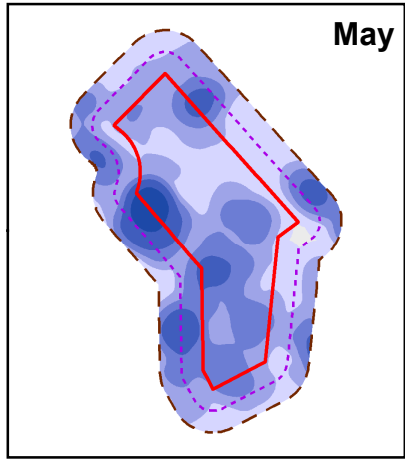
STATUS	SCALE
Approved	1:700,000

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

1.7 Razorbill

- 1.7.1.1 Spatial distribution maps, generated design-based estimates, for razorbill throughout the Caledonia North Site (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.





Legend

- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Razorbill Relative Density

- 0
- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 35
- 35 - 54

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0 5 10 15 20 25 30 km

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CONTRACTOR REV: 01

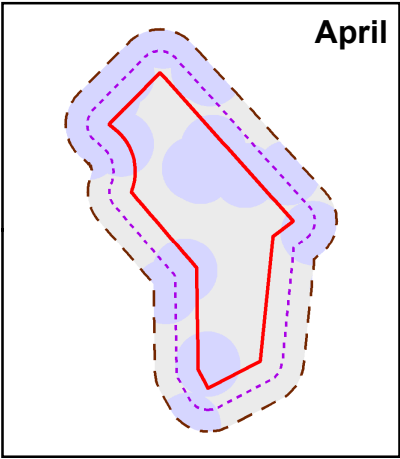
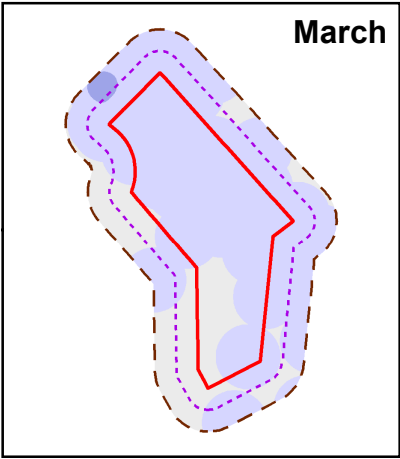
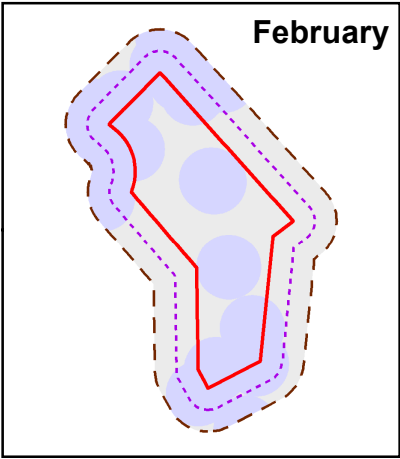
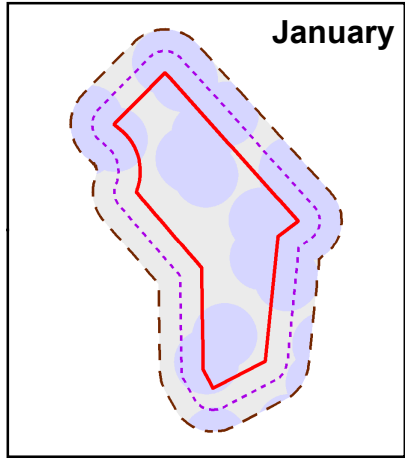
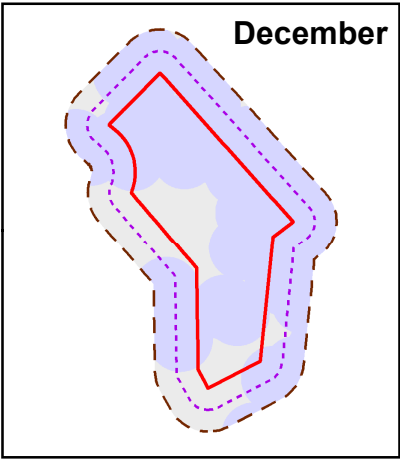
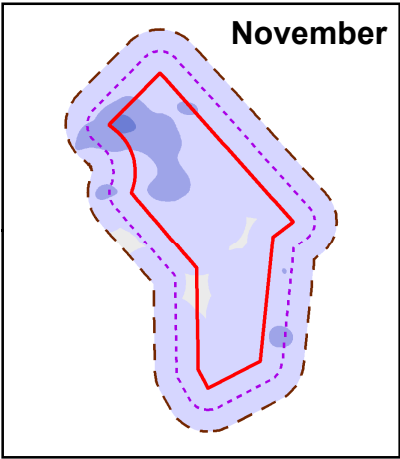
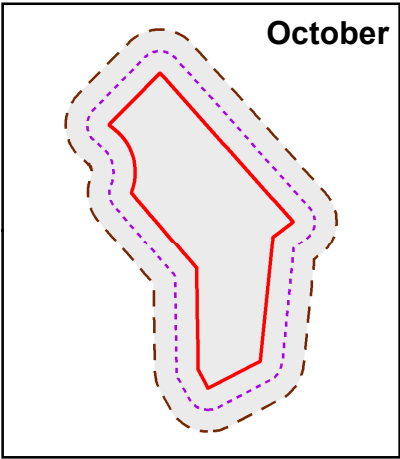
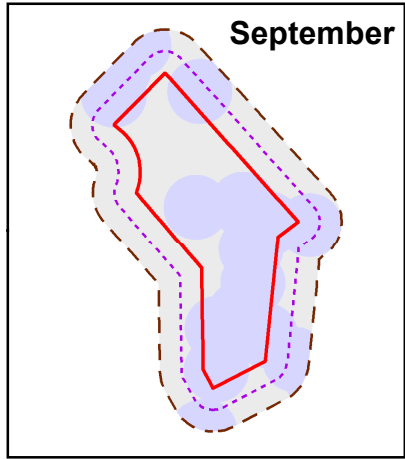
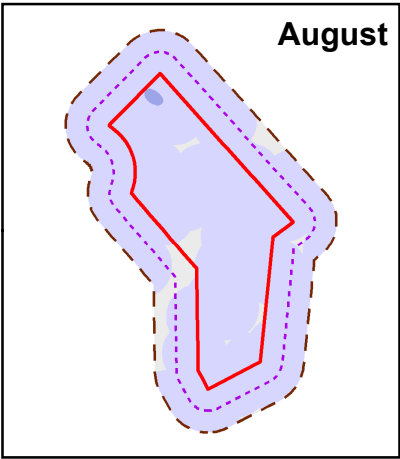
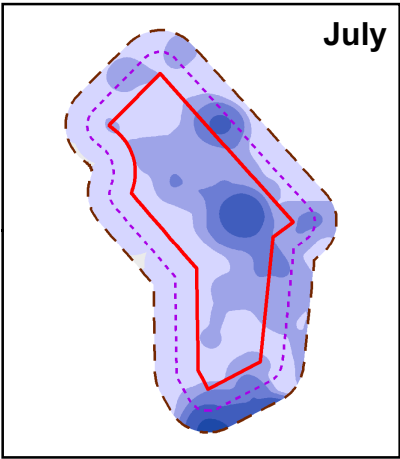
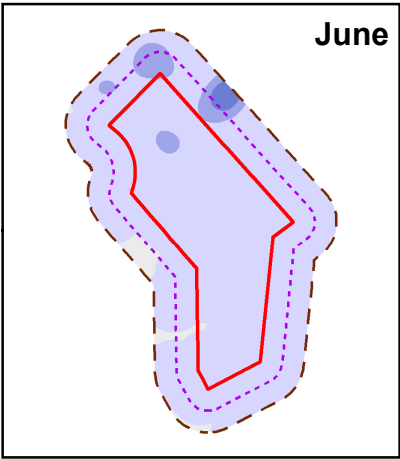
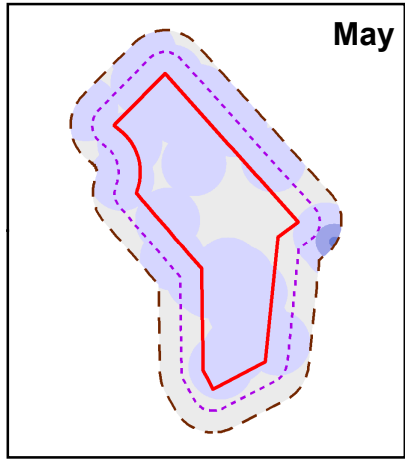
COORDINATE PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE
Figure 1-12: Distribution of razorbill between May 2022 and April 2023

STATUS: Approved
SCALE: 1:700,000
DRAWING NUMBER: N/A
SHEET NO: 01 of 01
REV: N/A

1.8 Fulmar

- 1.8.1.1 Spatial distribution maps, generated using design-based estimates, for fulmar throughout the Caledonia North Site (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.



Legend

- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

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

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01	20/09/2024	Approved	BB	EV	DH

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CONTRACTOR DRAWING NO: UKCAL1_GO_WNF_ORN_MAP_00373
CONTRACTOR REV: 01

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

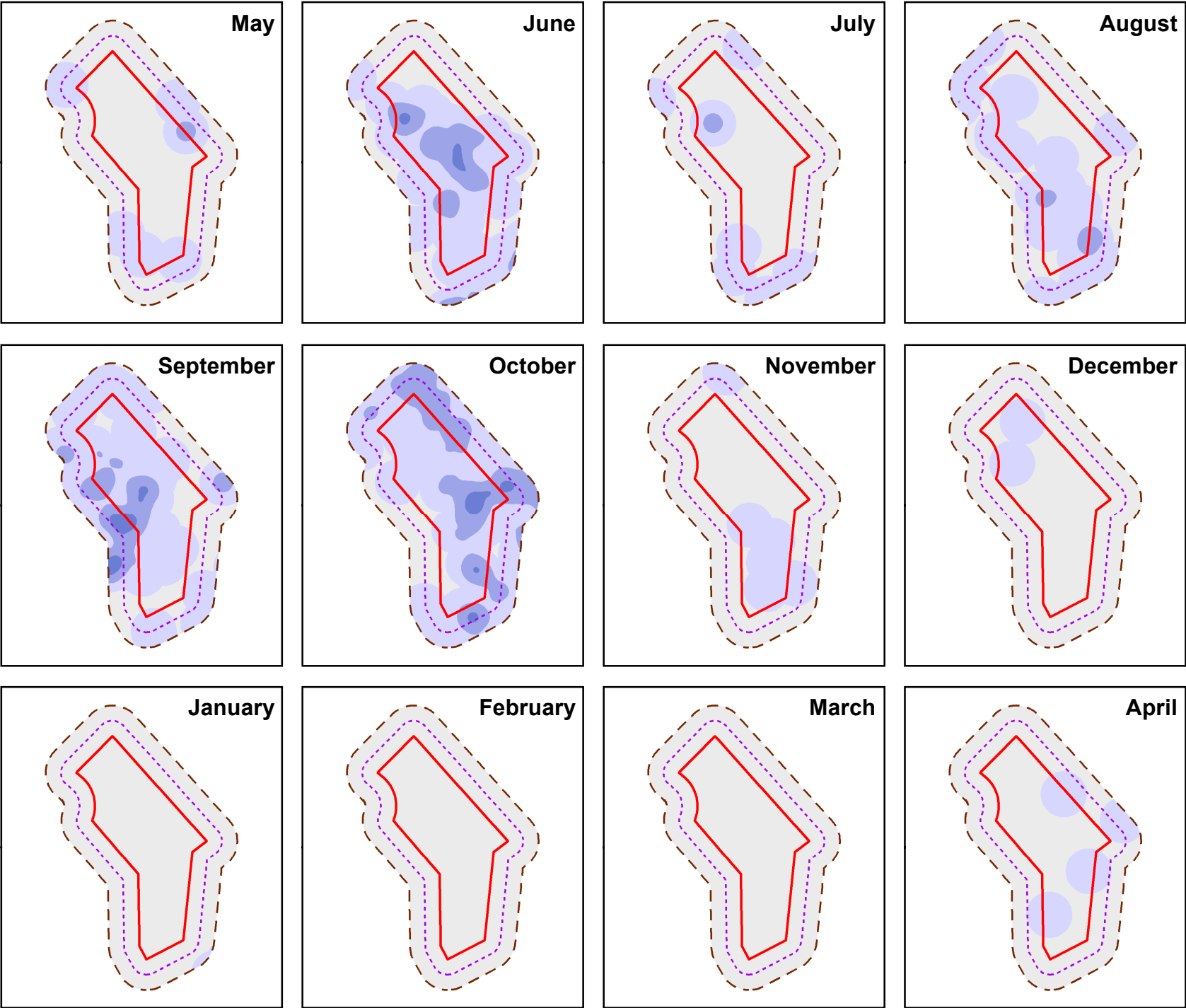
DRAWING TITLE
Figure 1-14: Distribution of fulmar between May 2022 and April 2023

STATUS: Approved
DRAWING NUMBER: N/A

SCALE: 1:700,000
SHEET NO: 01 of 01
REV: N/A

1.9 Gannet

- 1.9.1.1 Spatial distribution maps, generated using design-based estimates, for gannet throughout the Caledonia North Site (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.



Caledonia North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Gannet Relative Density

0

0 - 2

2 - 5

5 - 10

10 - 20

20 - 45

45 - 70

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05

0

5

10

15

20

25

30

km

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CALEDONIA

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APEM Group

CONTRACTOR DRAWING NO

UKCAL1_GO_WNF_ORN_MAP_0038(I)

CONTRACTOR REV

01

COORDINATE PARAMETERS

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

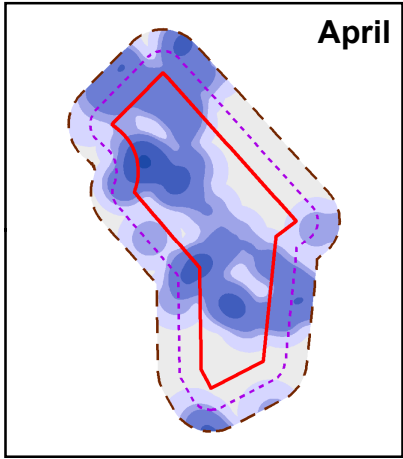
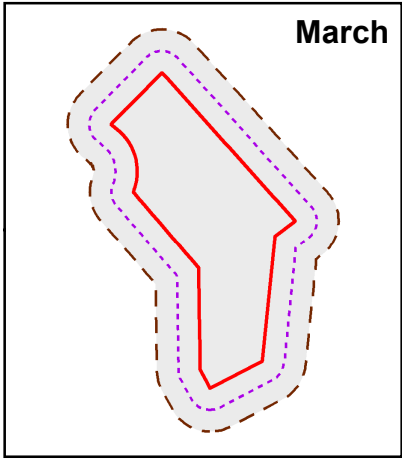
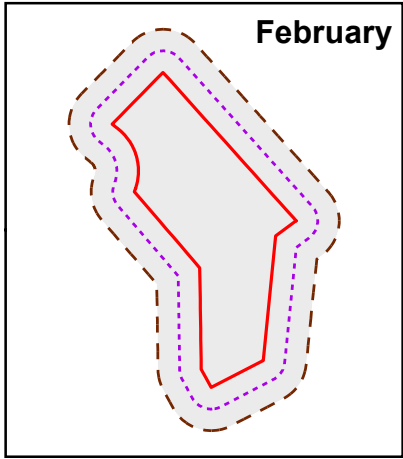
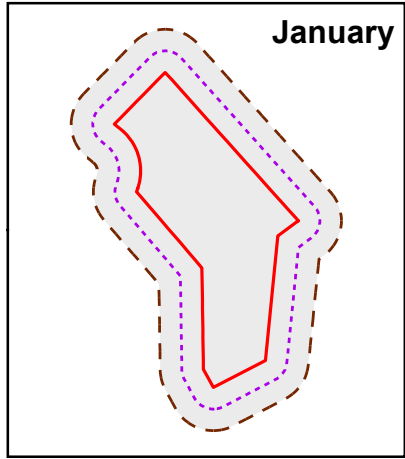
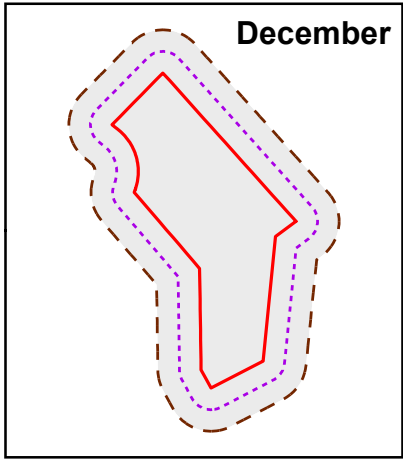
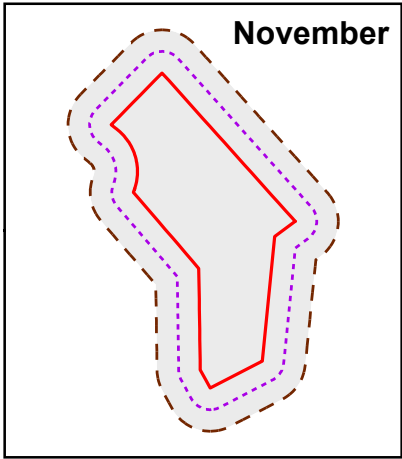
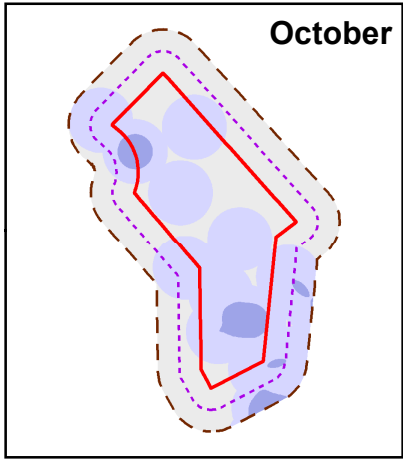
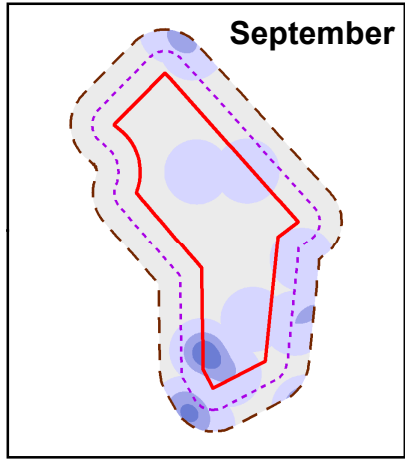
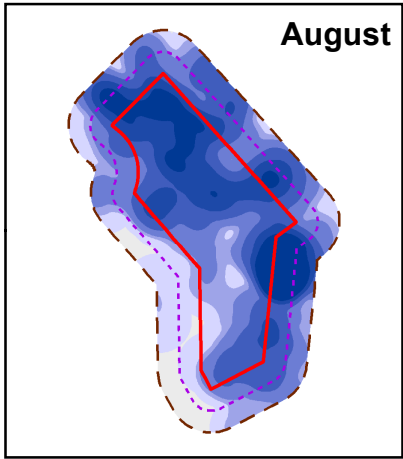
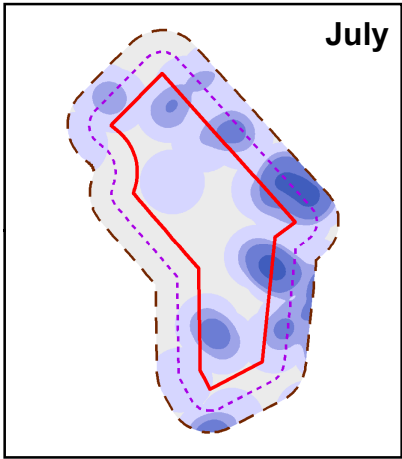
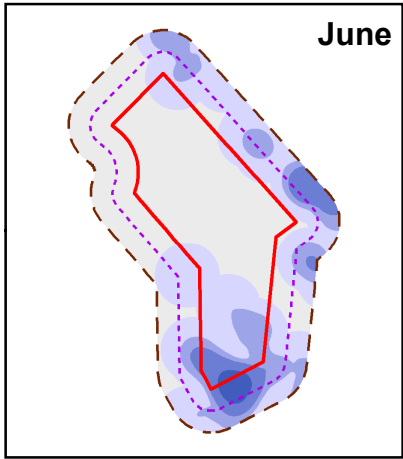
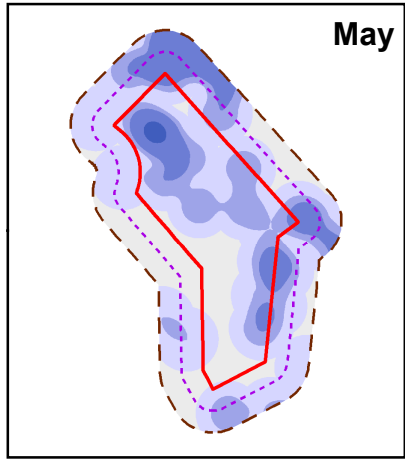
DRAWING TITLE

Figure 1-15: Distribution of gannet between May 2021 and April 2022

STATUS	Approved	SCALE	1:700,000
DRAWING NUMBER	N/A	SHEET NO	01 of 01
		REV	N/A

1.10 Puffin

- 1.10.1.1 Spatial distribution maps, generated design-based estimates, for puffin throughout the Caledonia North Site (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.



Caledonia North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Puffin Relative Density

0

0 - 1

1 - 2

2 - 5

5 - 10

10 - 15

15 - 20

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05

0

5

10

15

20

25

30

km

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CONTRACTOR REV
01

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

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

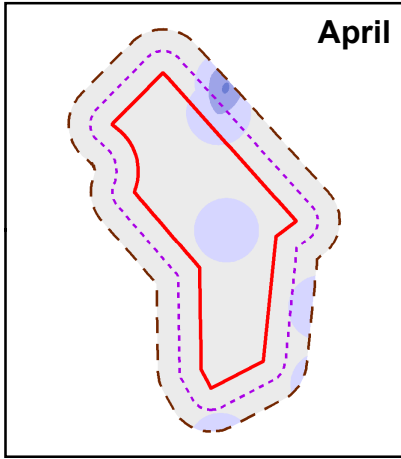
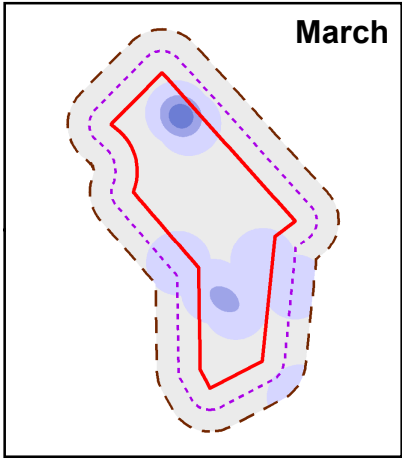
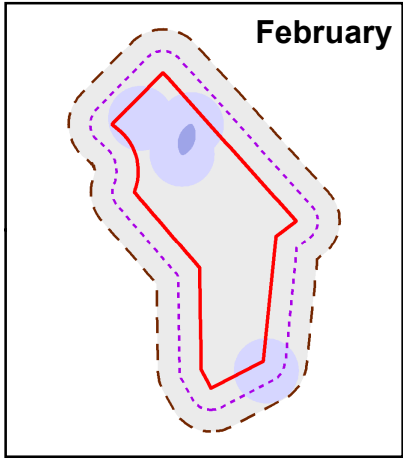
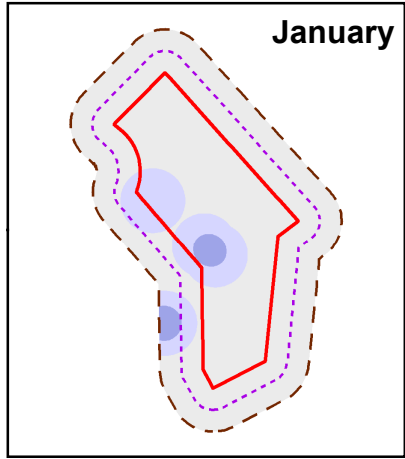
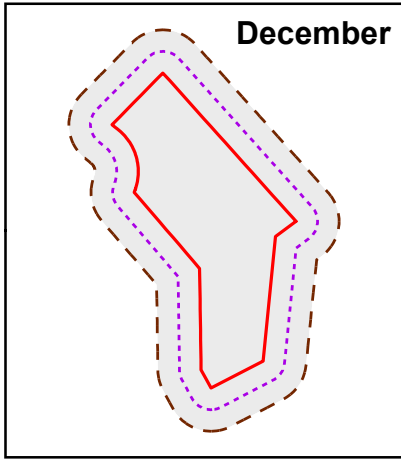
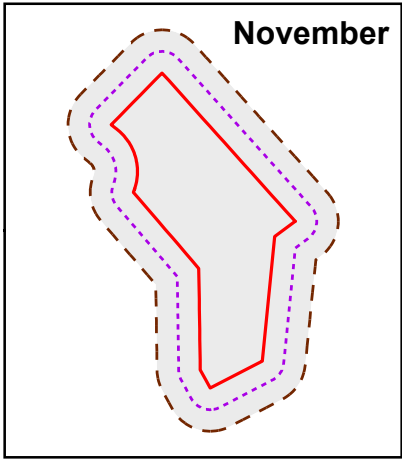
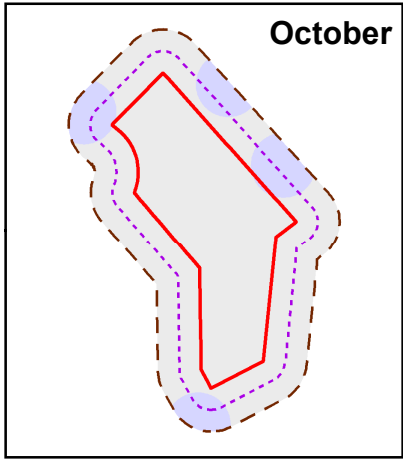
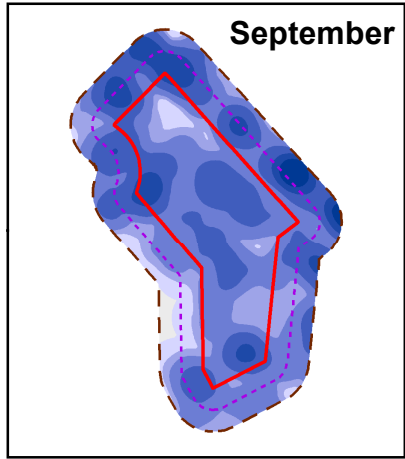
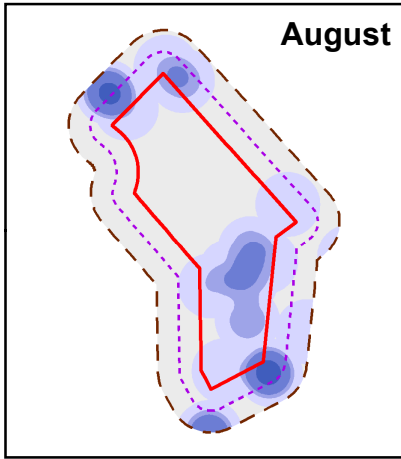
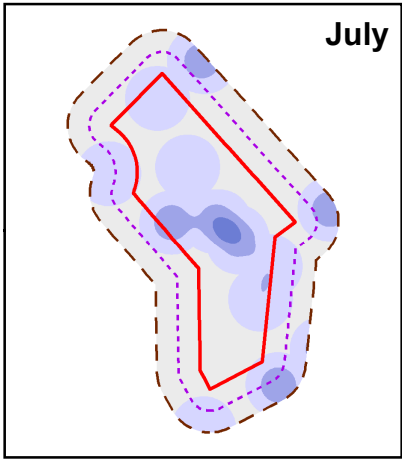
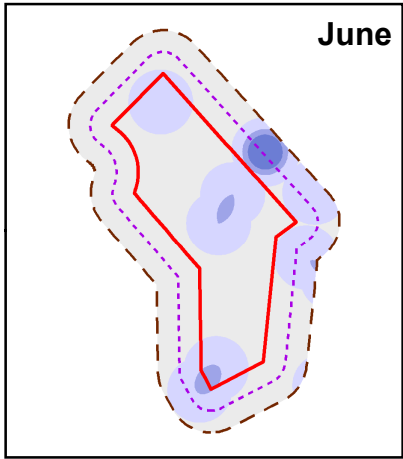
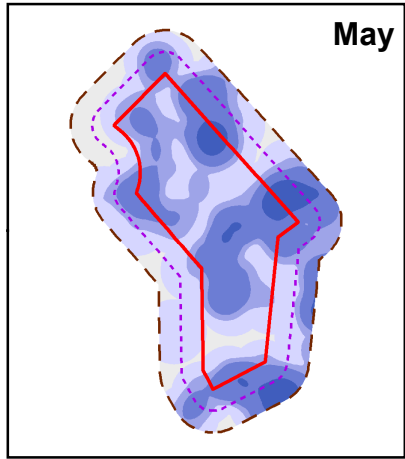
STATUS
Approved

DRAWING NUMBER
N/A

SCALE
1:700,000

SHEET NO
01 of 01

REV
N/A



Caledonia North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Puffin Relative Density

0

0 - 1

1 - 2

2 - 5

5 - 10

10 - 15

15 - 20

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0

5

10

15

20

25

30

km

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UKCAL1_GO_WNF_ORN_MAP_00387

CONTRACTOR REV
01

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

DRAWING TITLE
Figure 1-18: Distribution of puffin between May 2022 and April 2023

STATUS
Approved

SCALE
1:700,000

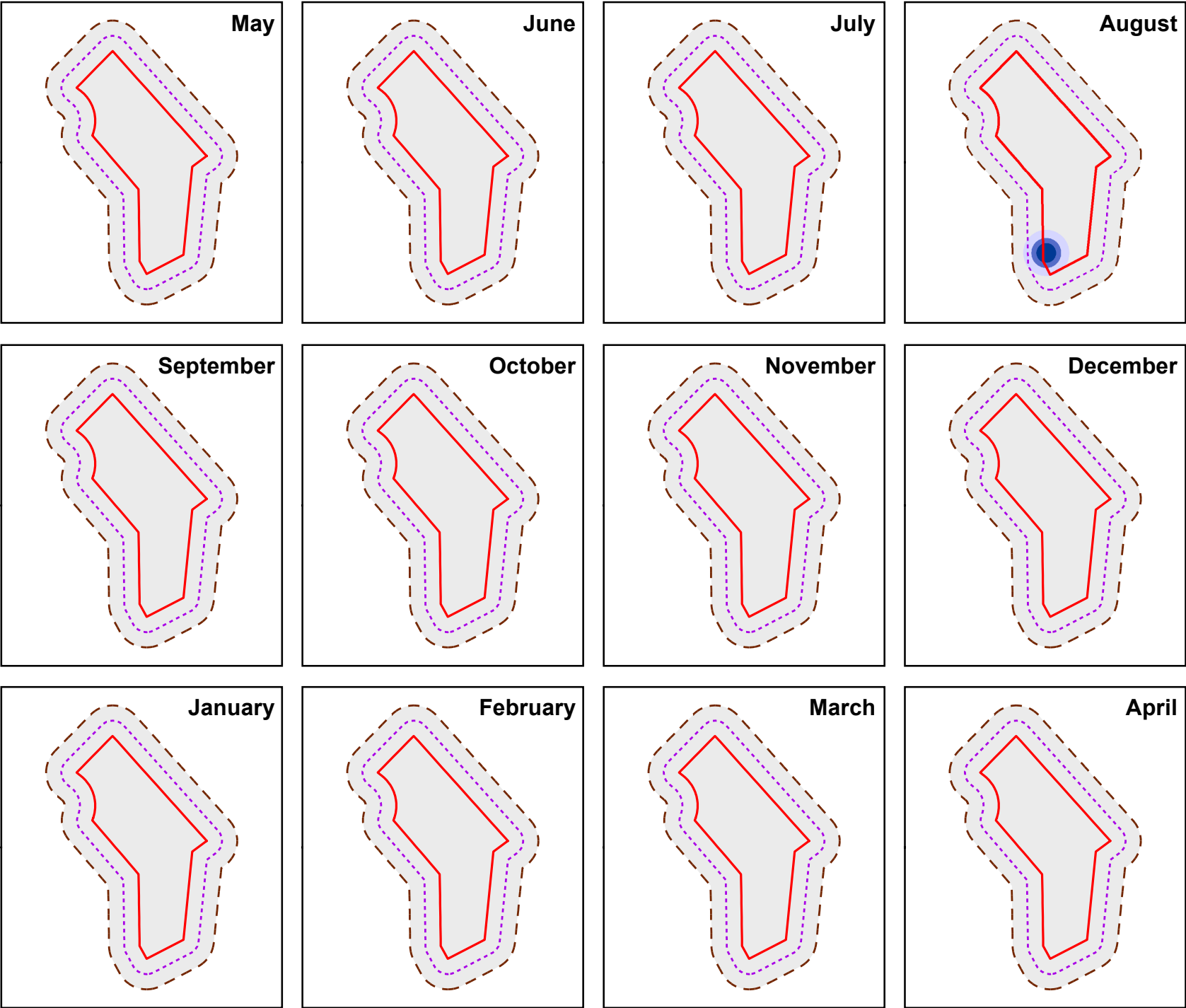
DRAWING NUMBER
N/A

SHEET NO
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 North Site (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.



- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Common tern Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 3

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UKCAL1_GO_WNF_ORN_MAP_00392

CONTRACTOR REV
01

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

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

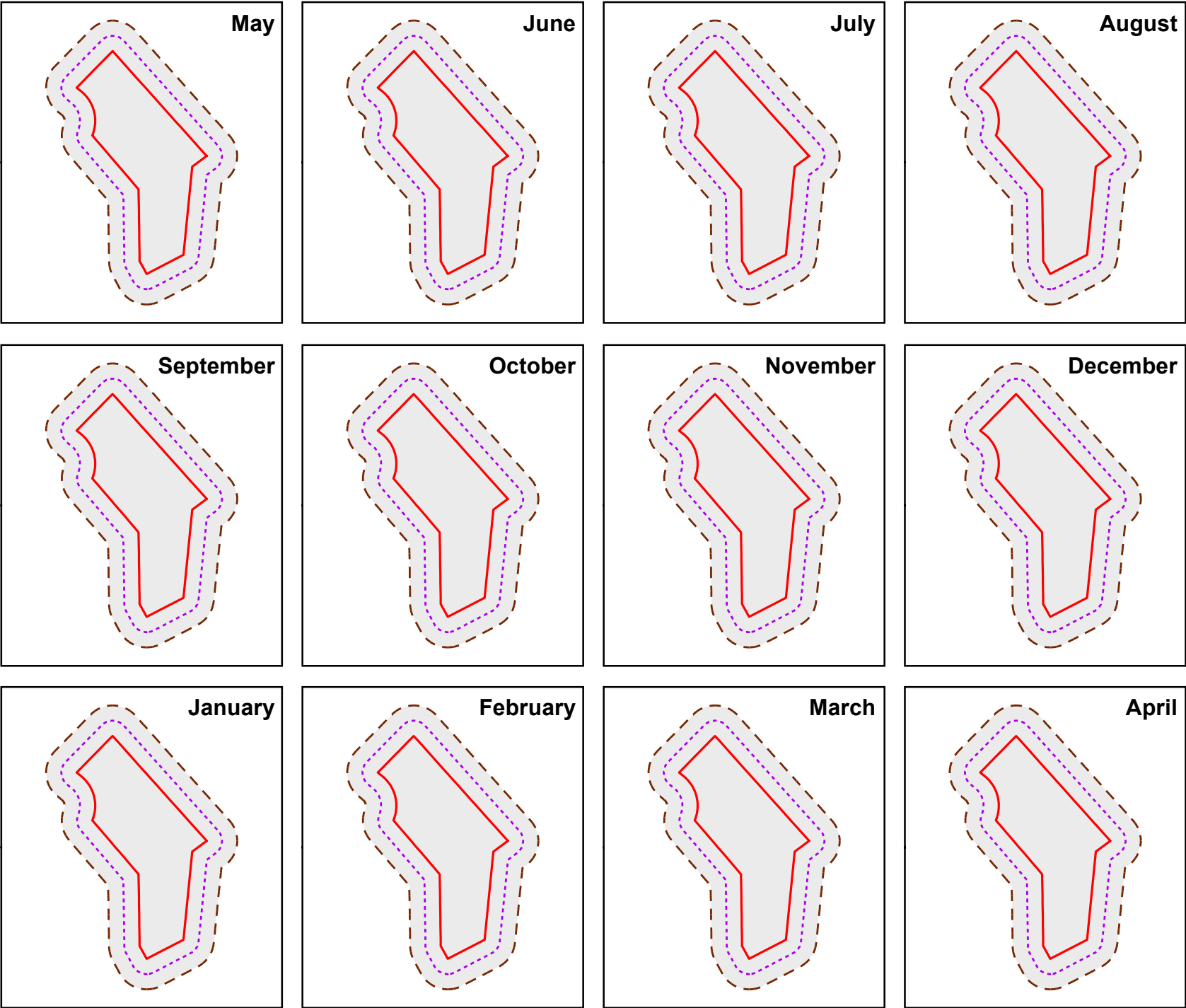
STATUS
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SCALE
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DRAWING NUMBER
N/A

SHEET NO
01 of 01

REV
N/A

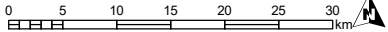


- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Common tern Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 3

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CONTRACTOR DRAWING NO: UKCAL1_GO_WNF_ORN_MAP_00393
CONTRACTOR REV: 01

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

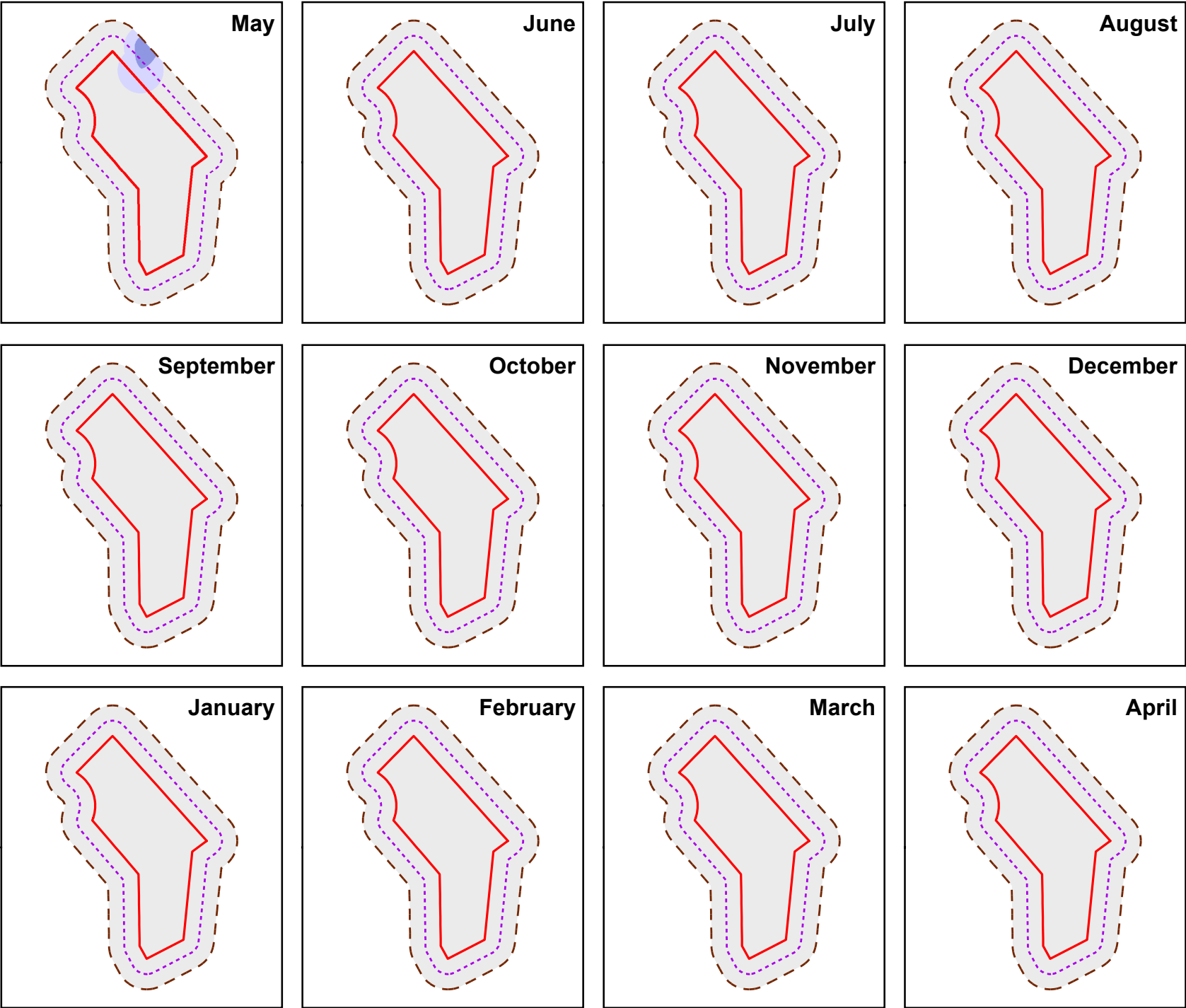
DRAWING TITLE

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

STATUS: Approved	SCALE: 1:700,000
DRAWING NUMBER: N/A	SHEET NO: 01 of 01
	REV: N/A

1.12 Arctic Tern

- 1.12.1.1 Spatial distribution maps, generated using design-based estimates, for Arctic tern throughout the Caledonia North Site (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.

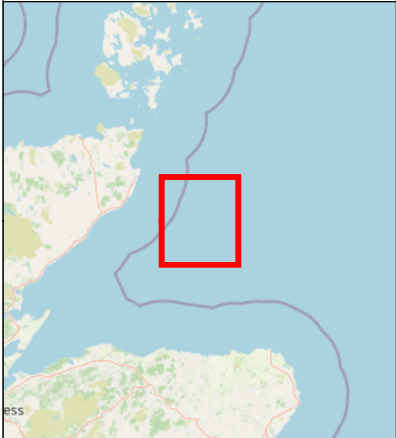


- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site



Arctic tern Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5

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CONTRACTOR DRAWING NO
UKCAL1_GO_WNF_ORN_MAP_00396

CONTRACTOR REV
01

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

DRAWING TITLE
Figure 1-21: Distribution of arctic tern between May 2021 and April 2022

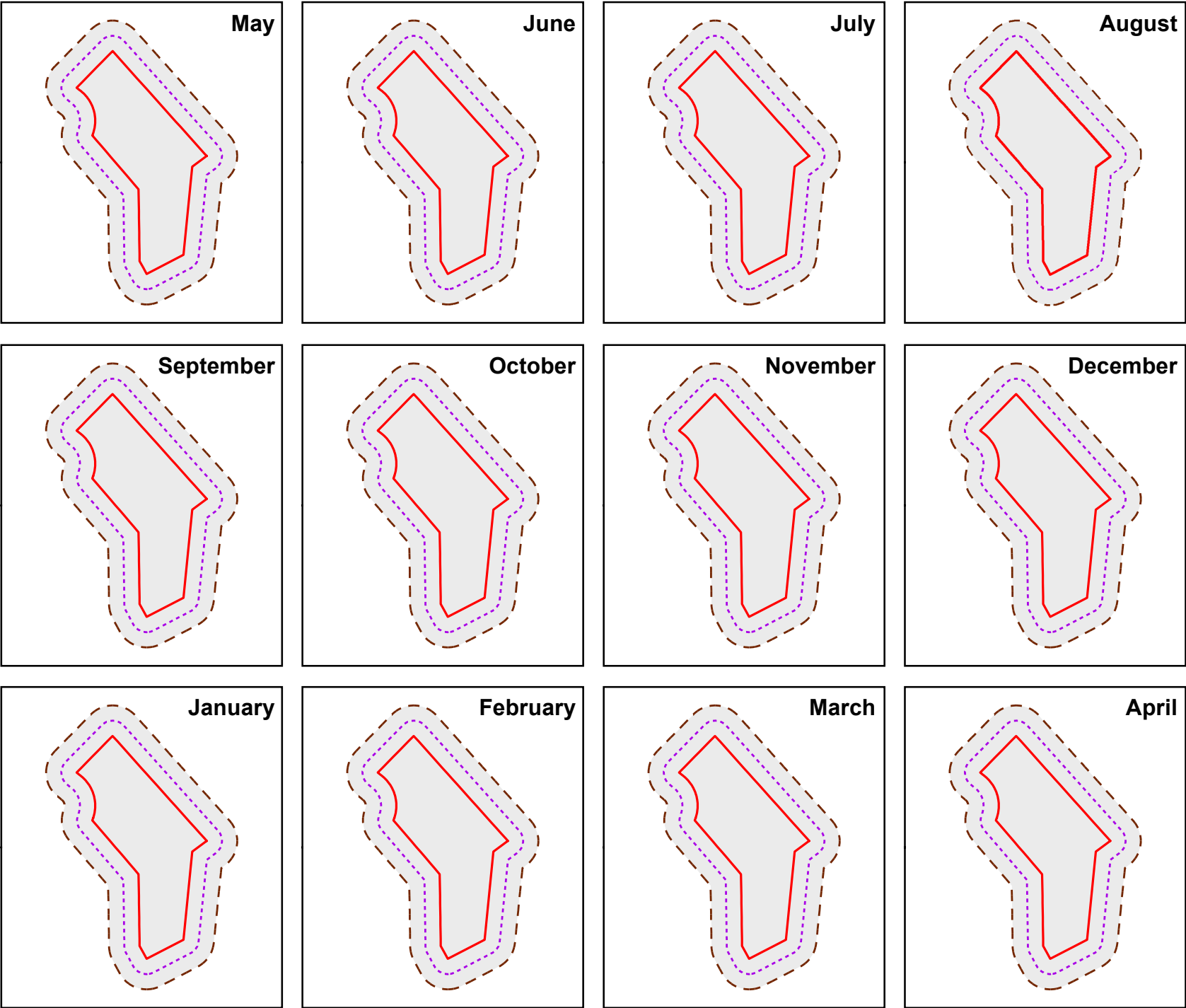
STATUS
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SCALE
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DRAWING NUMBER
N/A

SHEET NO
01 of 01

REV
N/A

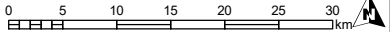


- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Arctic tern Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5

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REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP



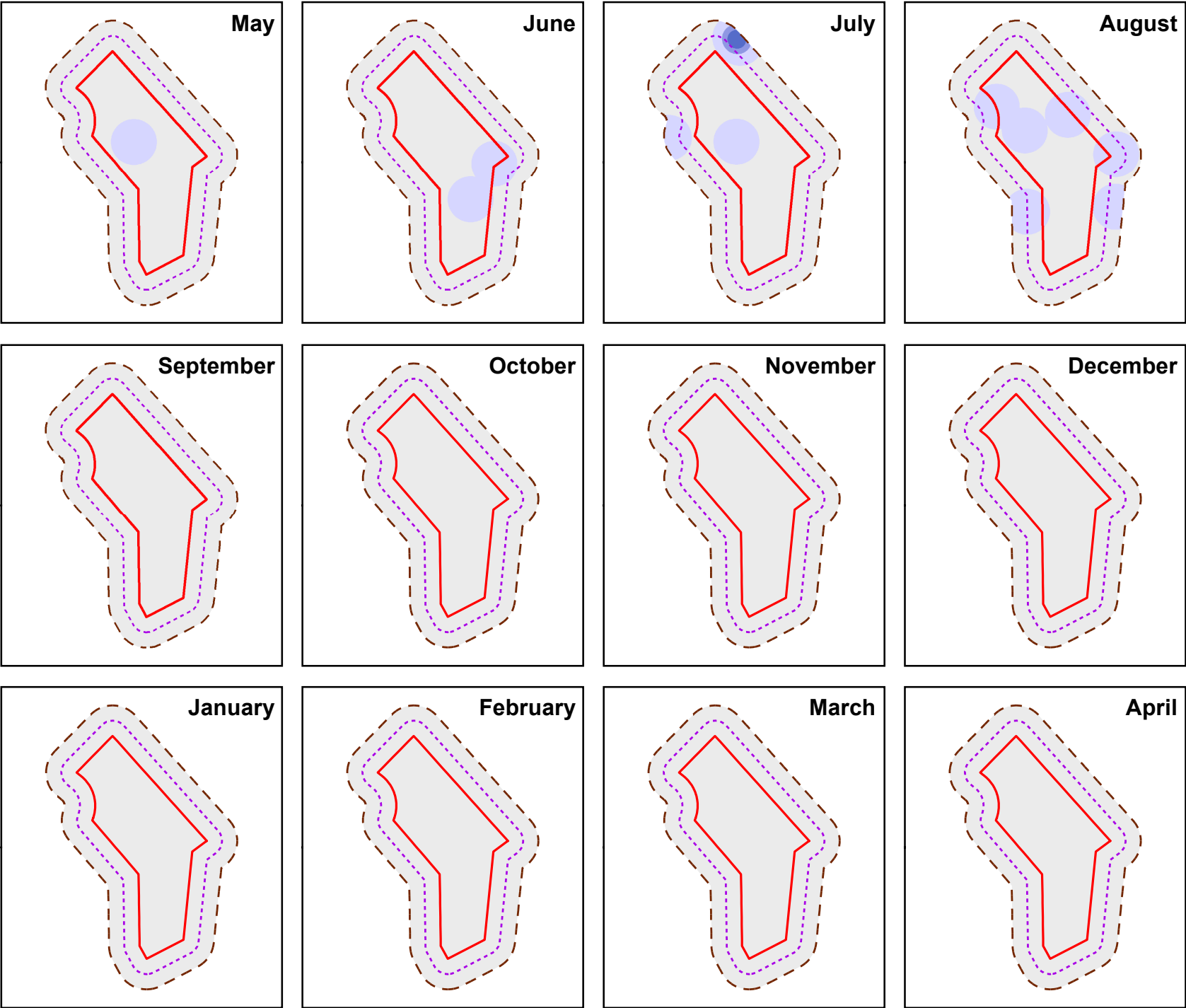
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GEOGRAPHIC PARAMETERS WGS 84 / UTM zone 30N (EPSG: 32630)	
DRAWING TITLE	

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

STATUS Approved	SCALE 1:700,000
DRAWING NUMBER N/A	SHEET NO 01 of 01
	REV N/A

1.13 Great Skua

- 1.13.1.1 Spatial distribution maps, generated using design-based estimates, for great skua throughout the Caledonia North Site (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.

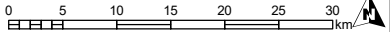


- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Great skua Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5

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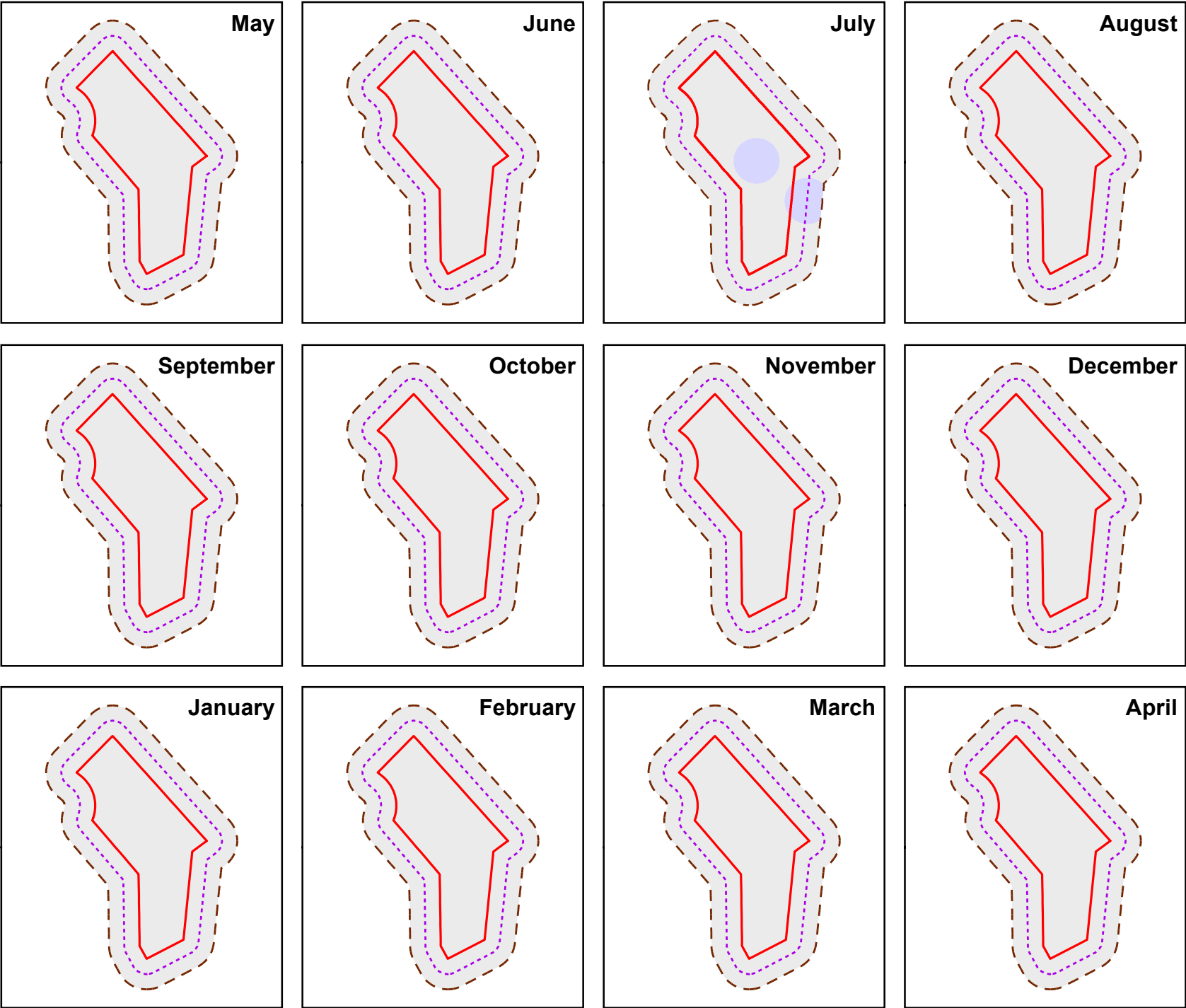
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CONTRACTOR REV: 01

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

DRAWING TITLE

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

STATUS Approved	SCALE 1:700,000
DRAWING NUMBER N/A	SHEET NO 01 of 01
	REV N/A

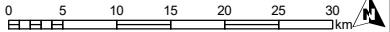


- Caledonia North Site
- 2km Buffer from Caledonia North Site
- 4km Buffer from Caledonia North Site

Great skua Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5

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UKCAL1_GO_WNF_ORN_MAP_0040E

CONTRACTOR REV
01

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

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

STATUS
Approved

SCALE
1:700,000

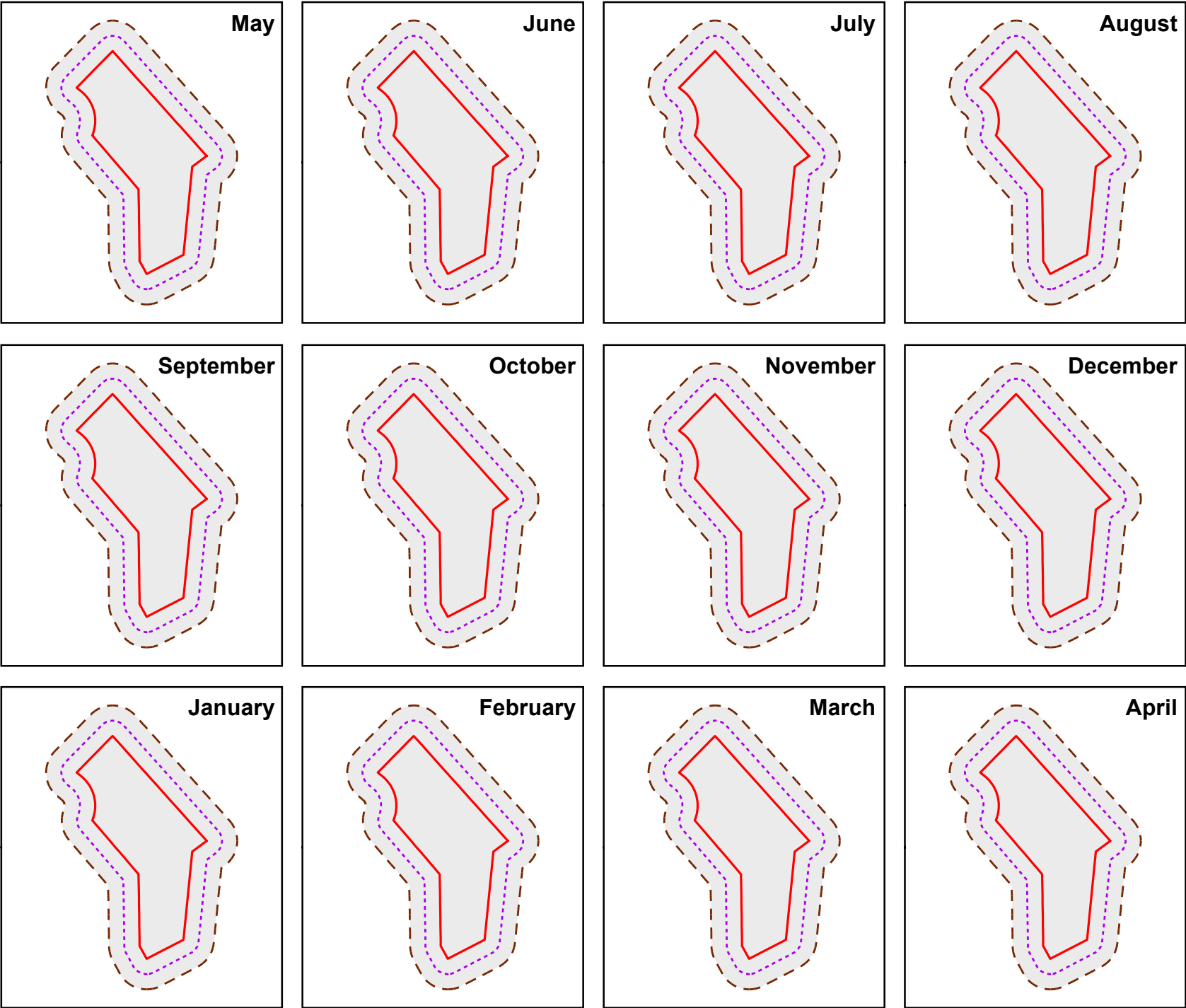
DRAWING NUMBER
N/A

SHEET NO
01 of 01

REV
N/A

1.14 Red-throated Diver

- 1.14.1.1 Spatial distribution maps, generated using design-based estimates, for red-throated diver throughout the Caledonia North Site (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.



Caledonia North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Red-throated diver Relative Density

0

0 - 1

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05

0

5

10

15

20

25

30

km

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UKCAL1_GO_WNF_ORN_MAP_0041C

CONTRACTOR REV

01

COORDINATE PARAMETERS

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

DRAWING TITLE

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

STATUS

Approved

SCALE

1:700,000

DRAWING NUMBER

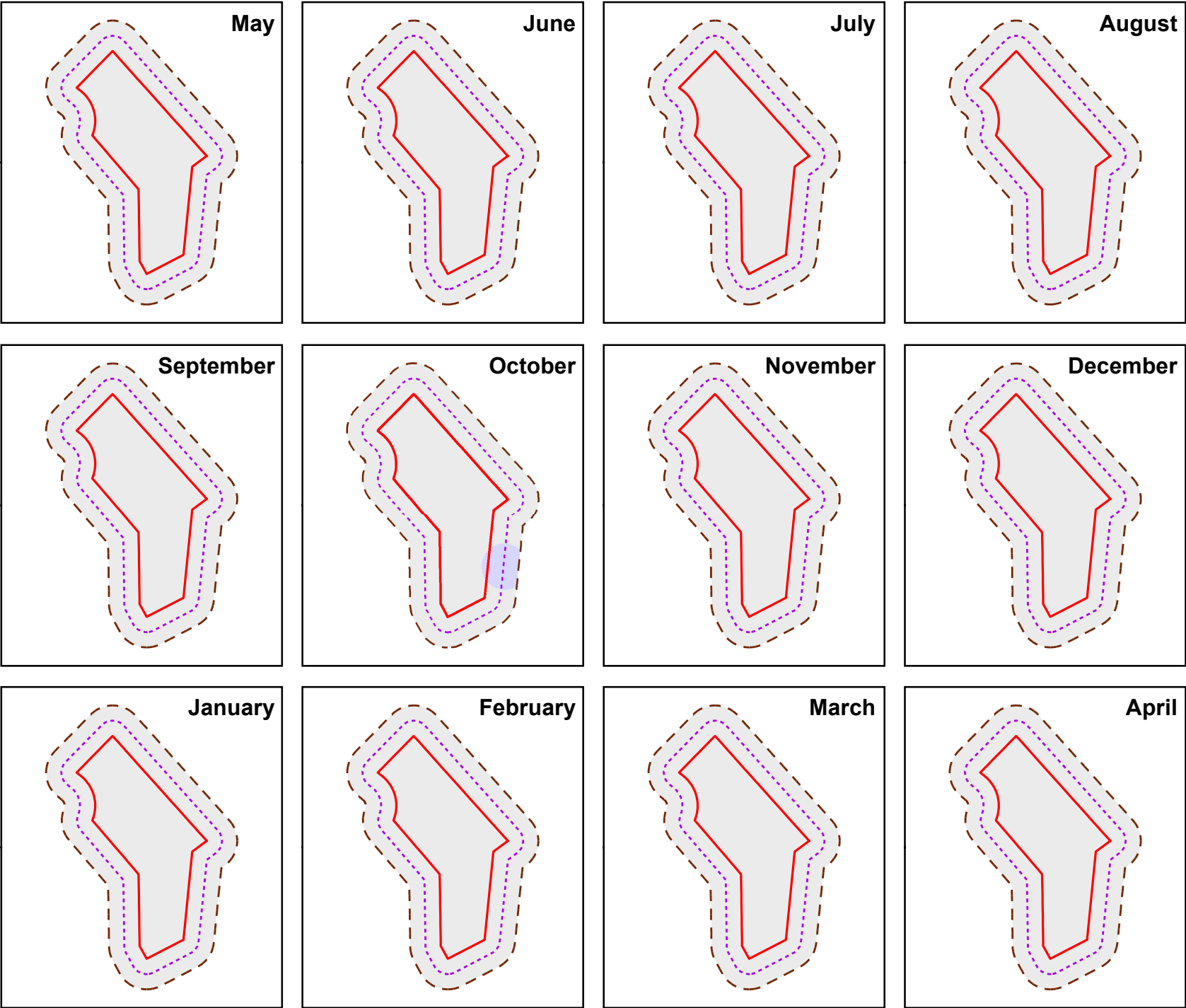
N/A

SHEET NO

01 of 01

REV

N/A



Caledonia North Site

2km Buffer from Caledonia North Site

4km Buffer from Caledonia North Site

Red-throated diver Relative Density

0

0 - 1

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05

0

5

10

15

20

25

30

km

01	20/09/2024	Approved	BB	EV	DH
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UKCAL1_GO_WNF_ORN_MAP_00411

CONTRACTOR REV

01

COORDINATE PARAMETERS

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

DRAWING TITLE

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

STATUS

Approved

SCALE

1:700,000

DRAWING NUMBER

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01 of 01

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