CALEDONIA
Offshore Wind Farm

Code: UKCAL-CWF-CON-EIA-RPT-00007-7B27

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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OW
OCEAN WINDS

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

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List of Figures

Acronyms and Abbreviations

OWF	Offshore Wind Farm

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*.

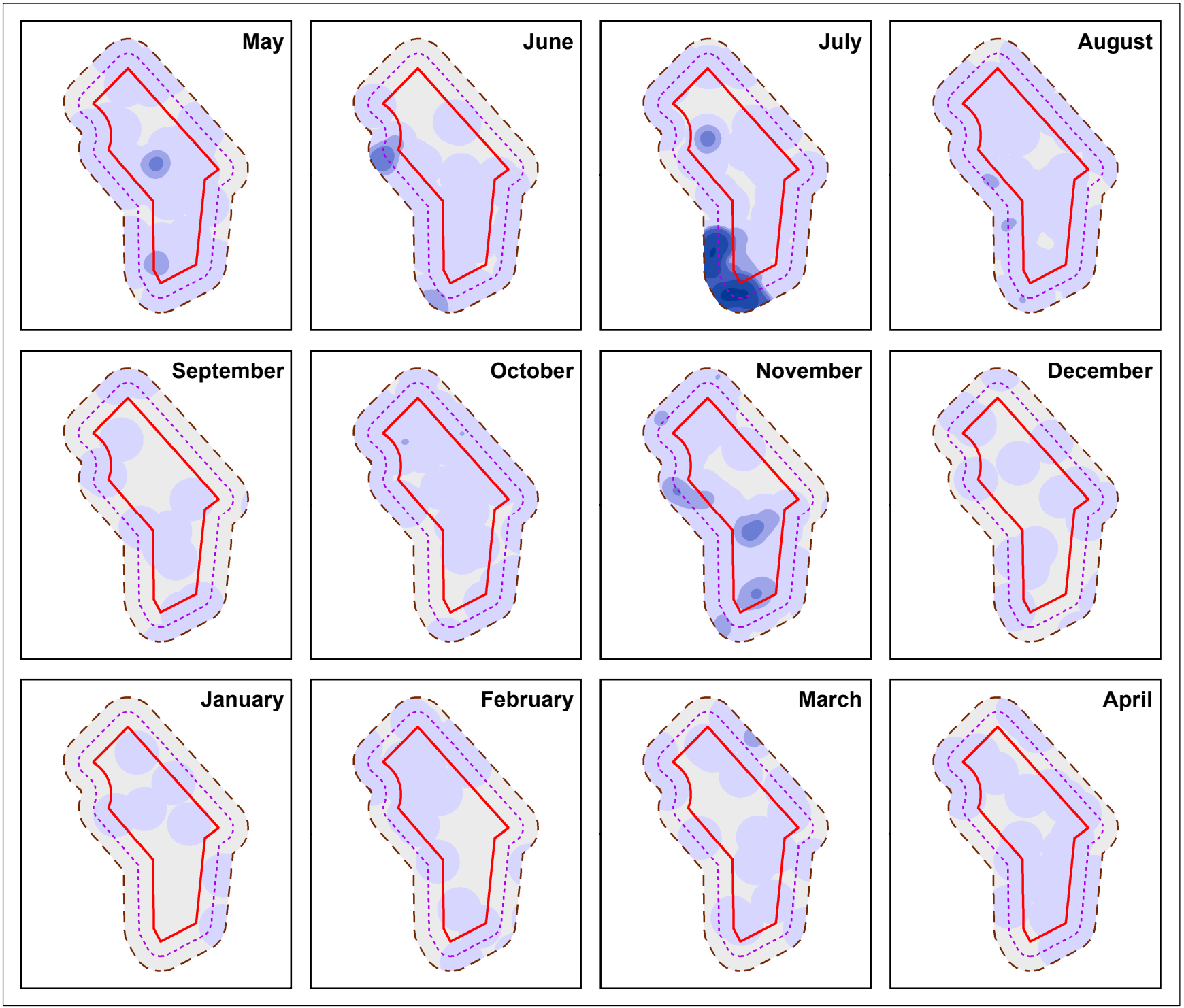
1.1.1.3 For the purposes of this report, the spatial distribution of seabirds within Caledonia North are presented in the form of heatmaps. The heatmaps present data on a monthly basis in order to account for species-specific spatial and temporal distributions for the purposes of defining the Caledonia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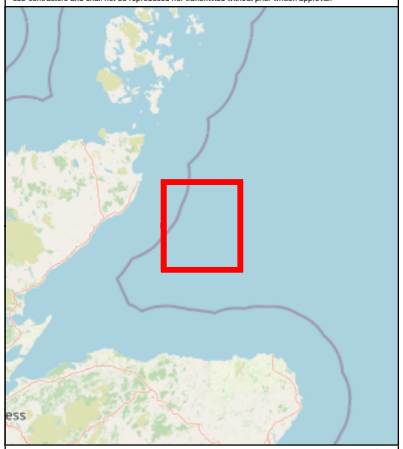

0 5 10 15 20 25 30 km

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CALEDONIA Offshore Wind Farm

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DRAWING TITLE

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

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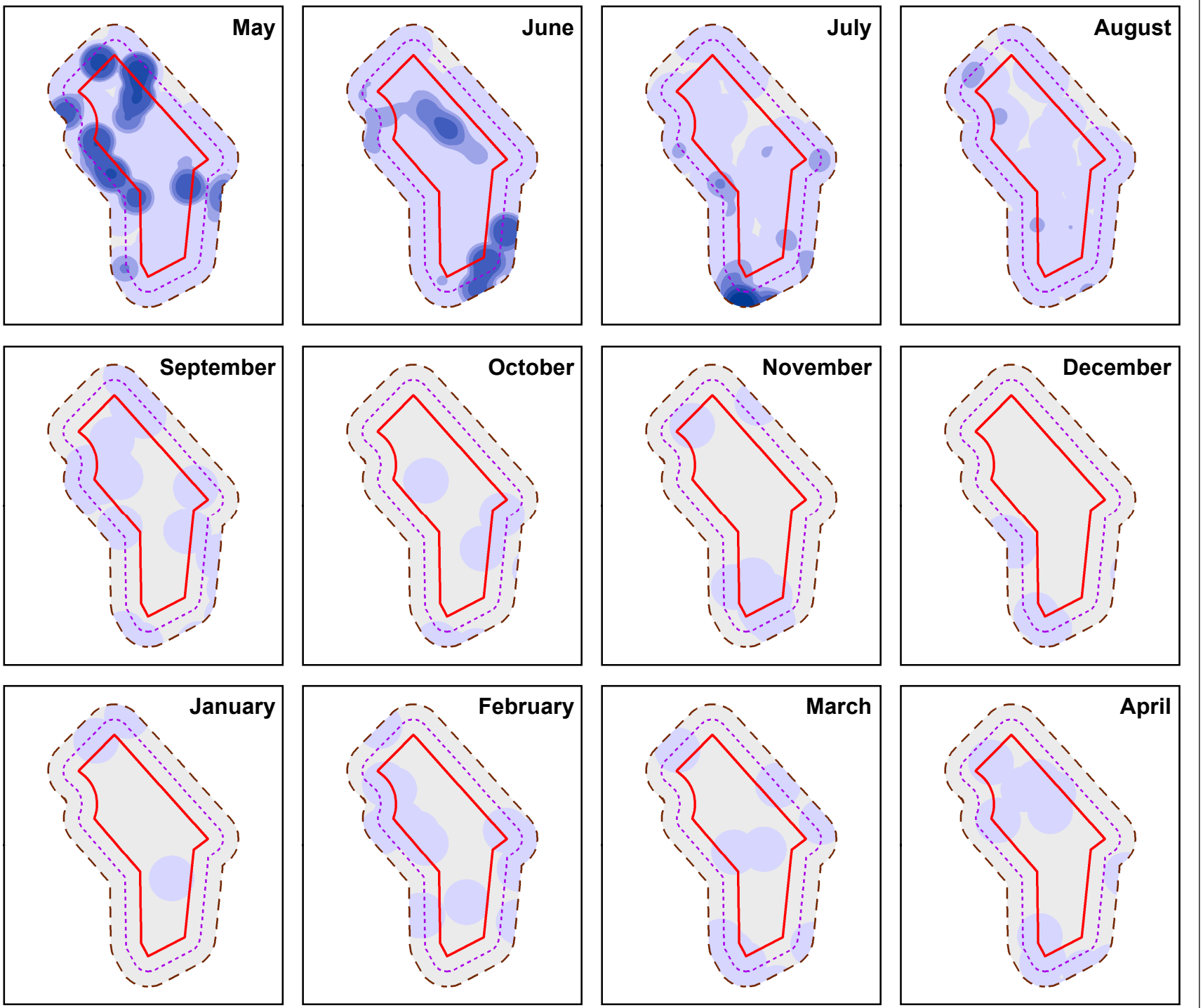

Caledonia North Site

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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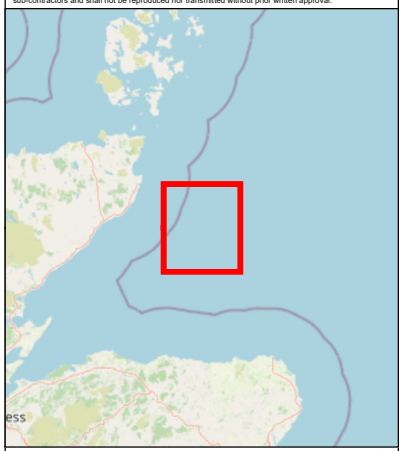

0 5 10 15 20 25 30 km

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CONTRACTOR REV: 01

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

DRAWING TITLE

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

STATUS: Approved

SCALE: 1:700,000

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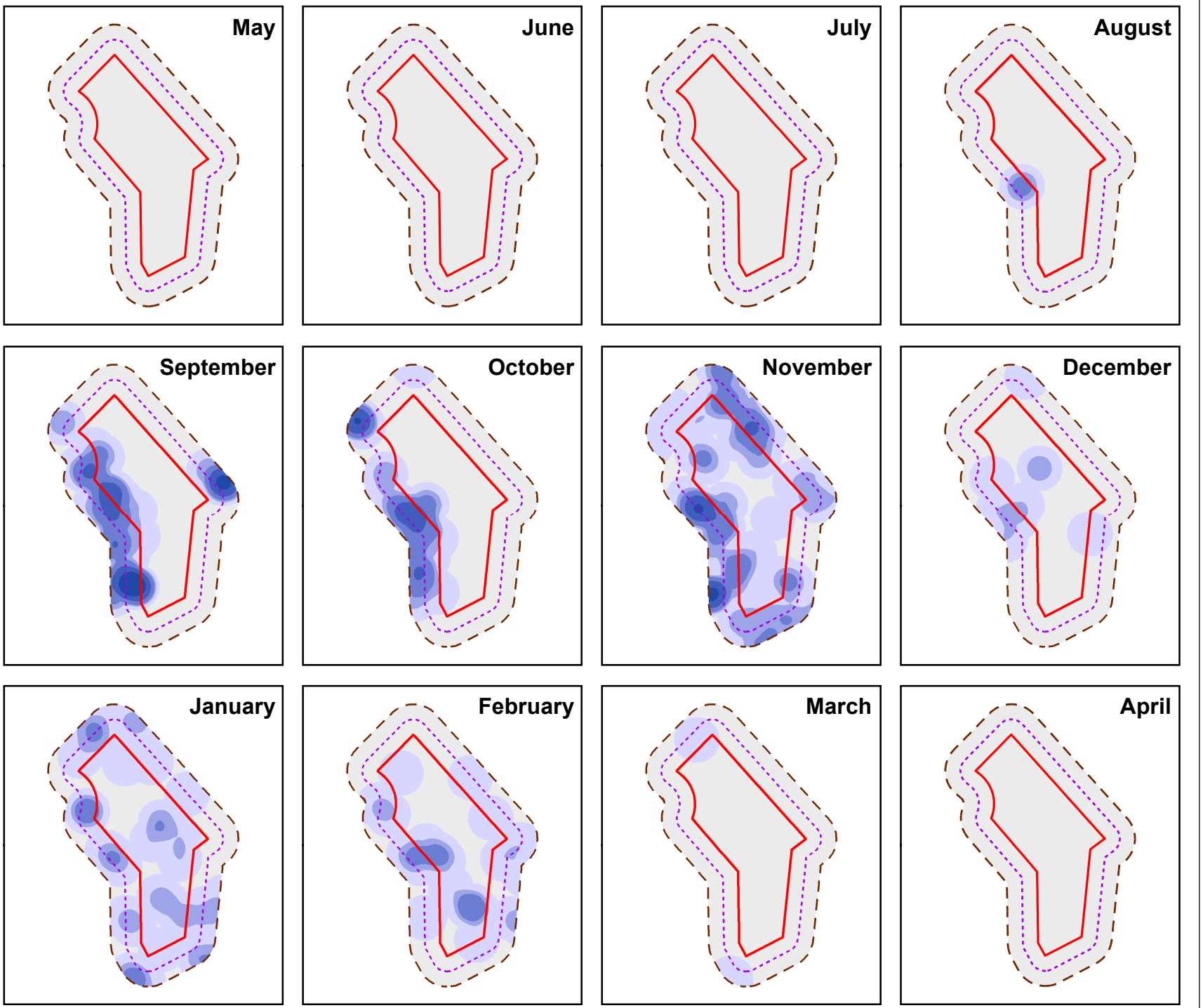
REV: N/A

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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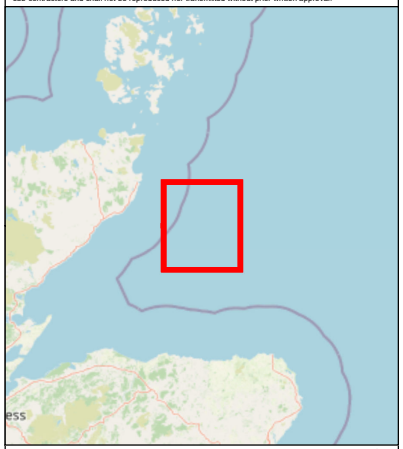

0 5 10 15 20 25 30 km

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

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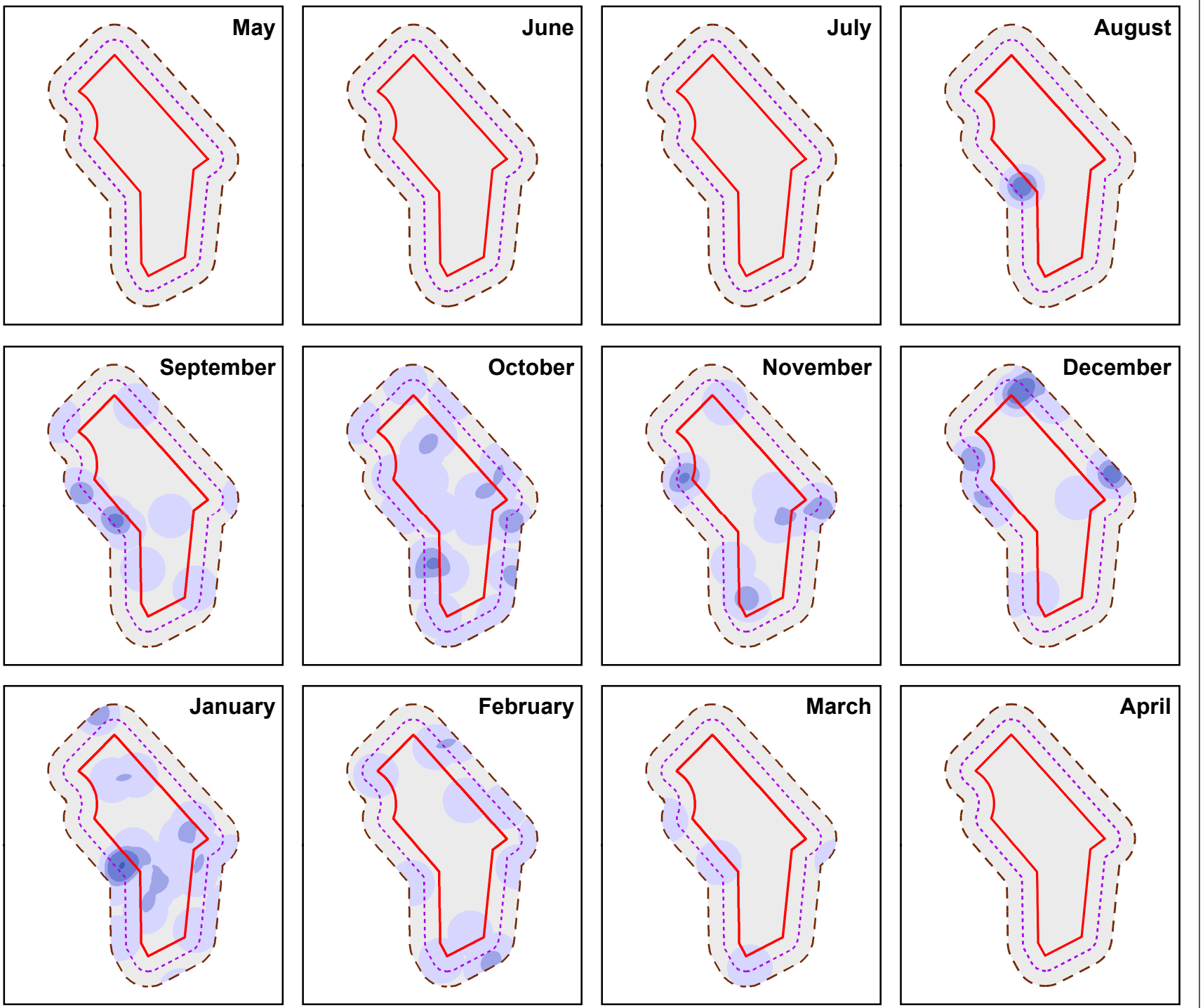

Caledonia North Site

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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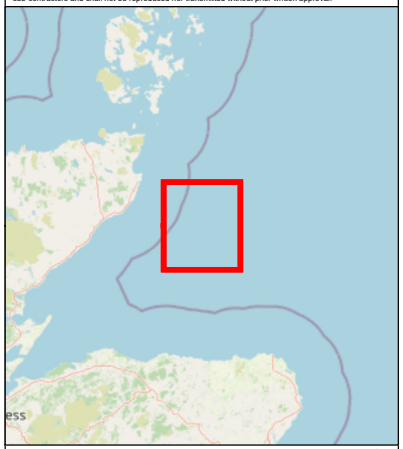

0 5 10 15 20 25 30 km

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

STATUS: Approved	SCALE: 1:700,000	
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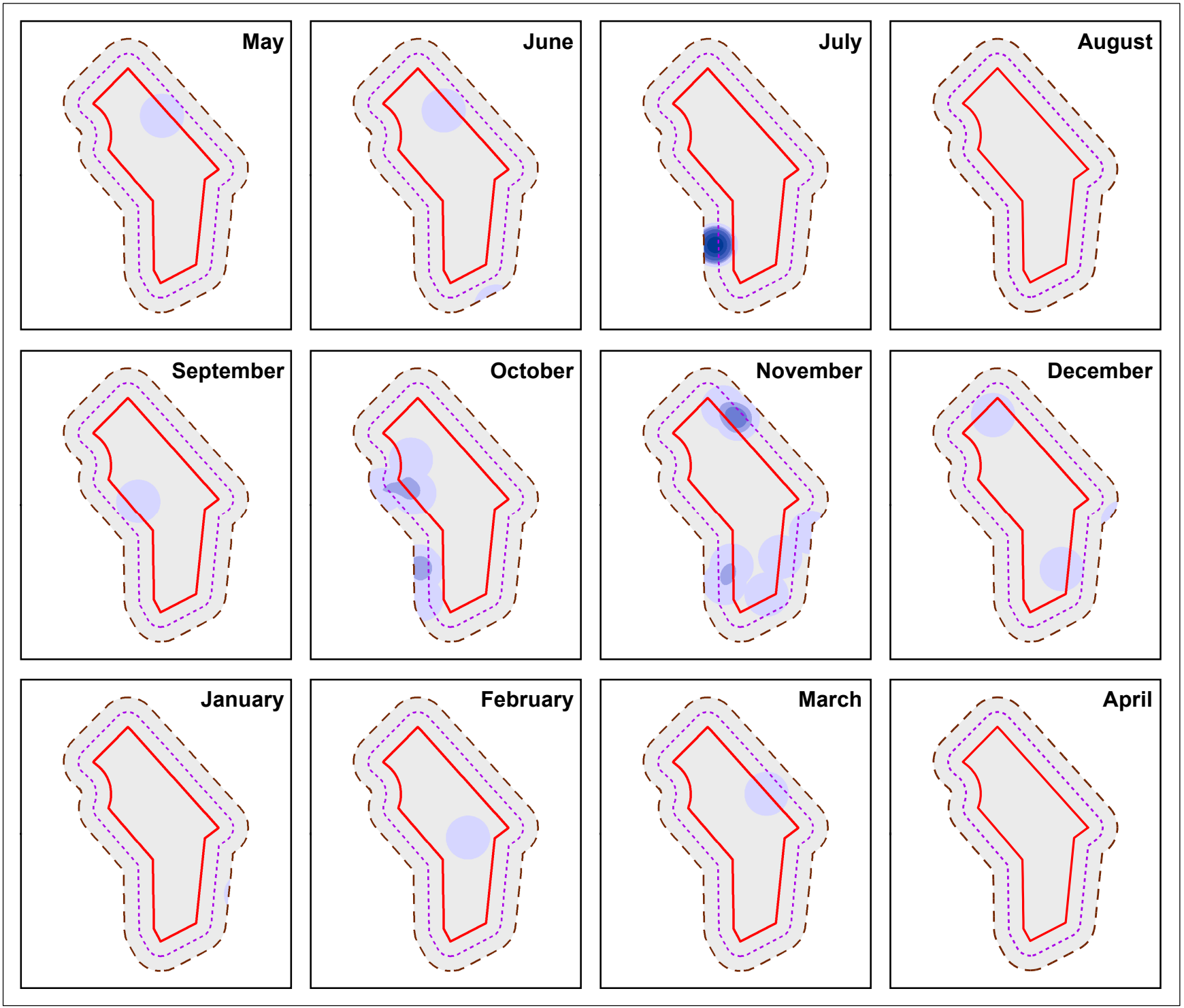
1.4 Herring Gull

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.



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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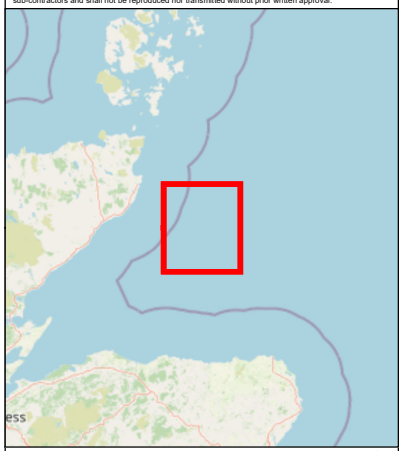

0 5 10 15 20 25 30 km

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DRAWING TITLE

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

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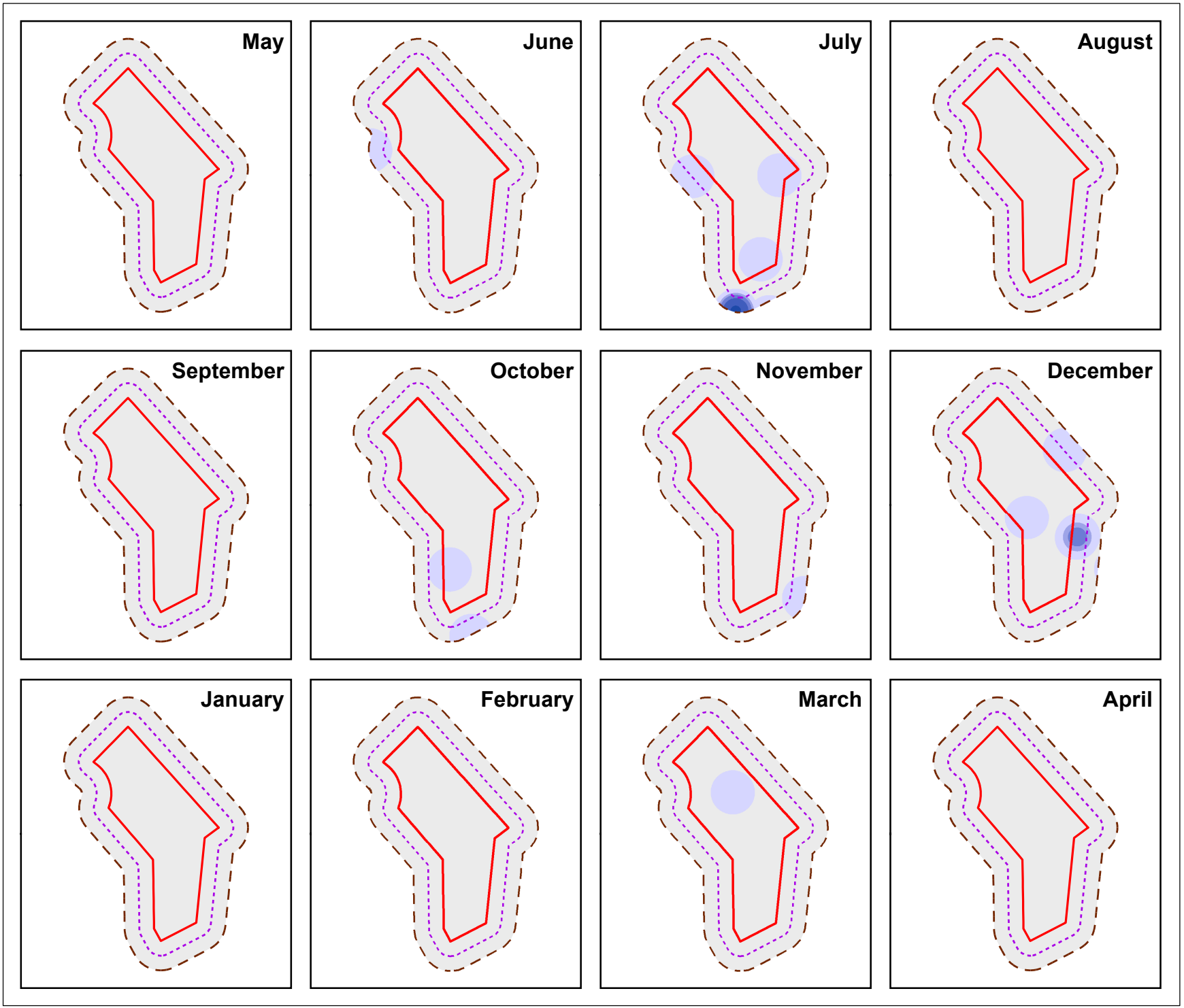

Caledonia North Site

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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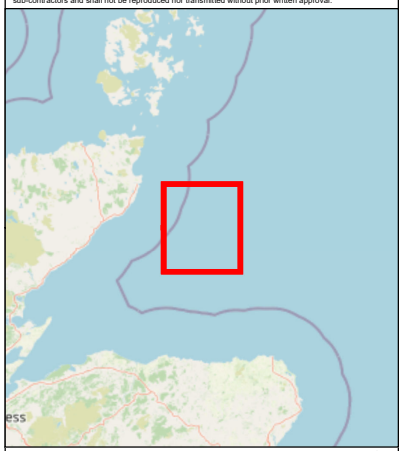

0 5 10 15 20 25 30 km

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Figure 1-6: Distribution of herring gull between May 2022 and April 2023

STATUS: Approved

SCALE: 1:700,000

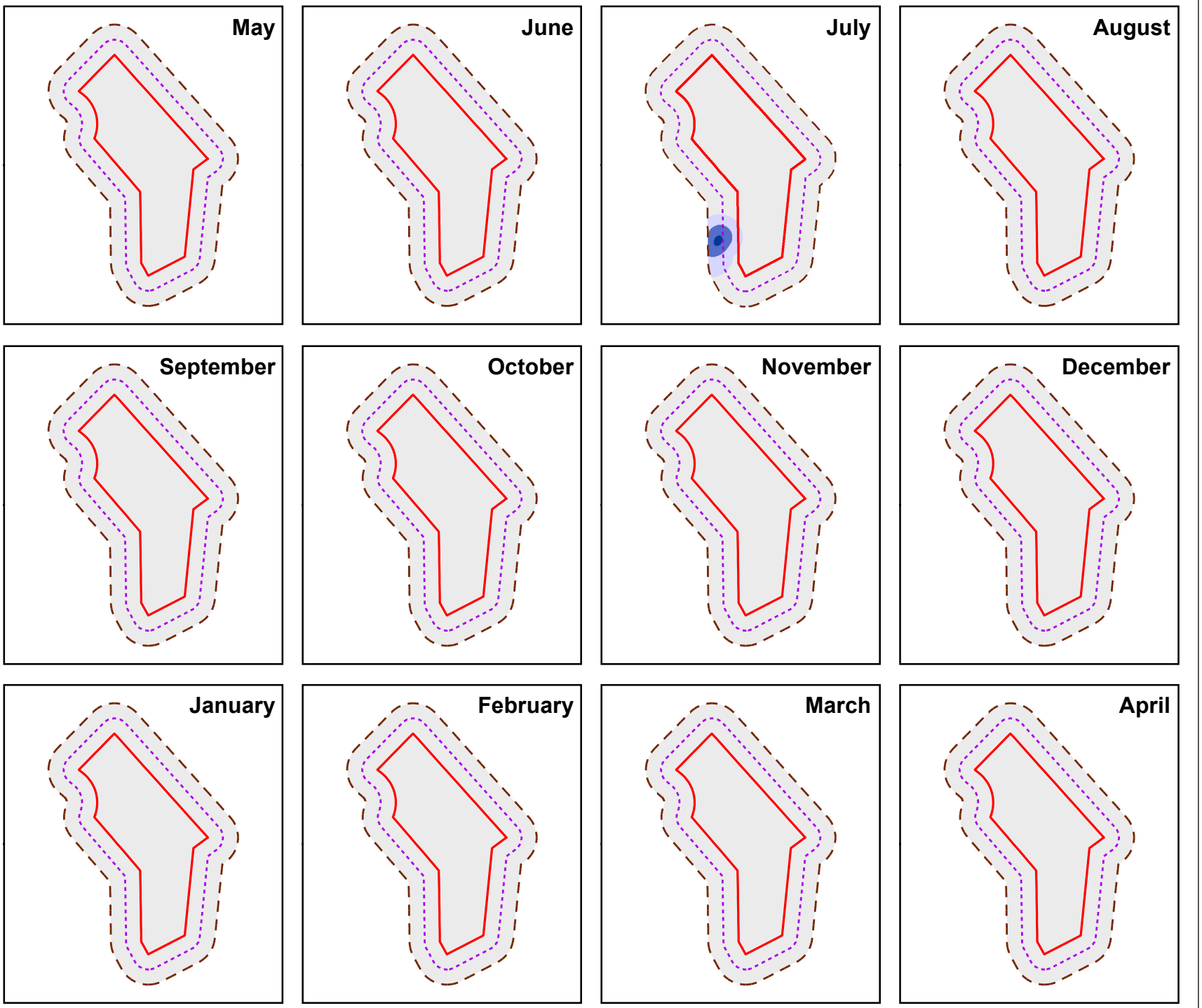
DRAWING NUMBER: N/A

SHEET NO: 01 of 01

REV: N/A

1.5 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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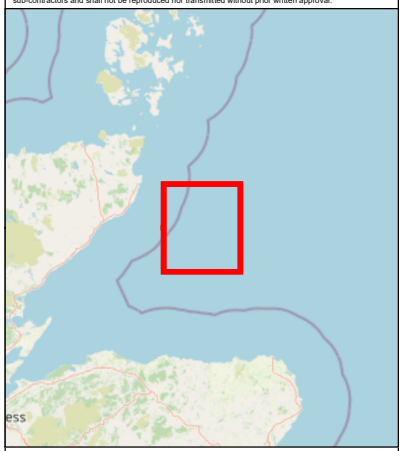

0 5 10 15 20 25 30 km

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CONTRACTOR REV: 01

GEODETIC 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

STATUS: Approved

SCALE: 1:700,000

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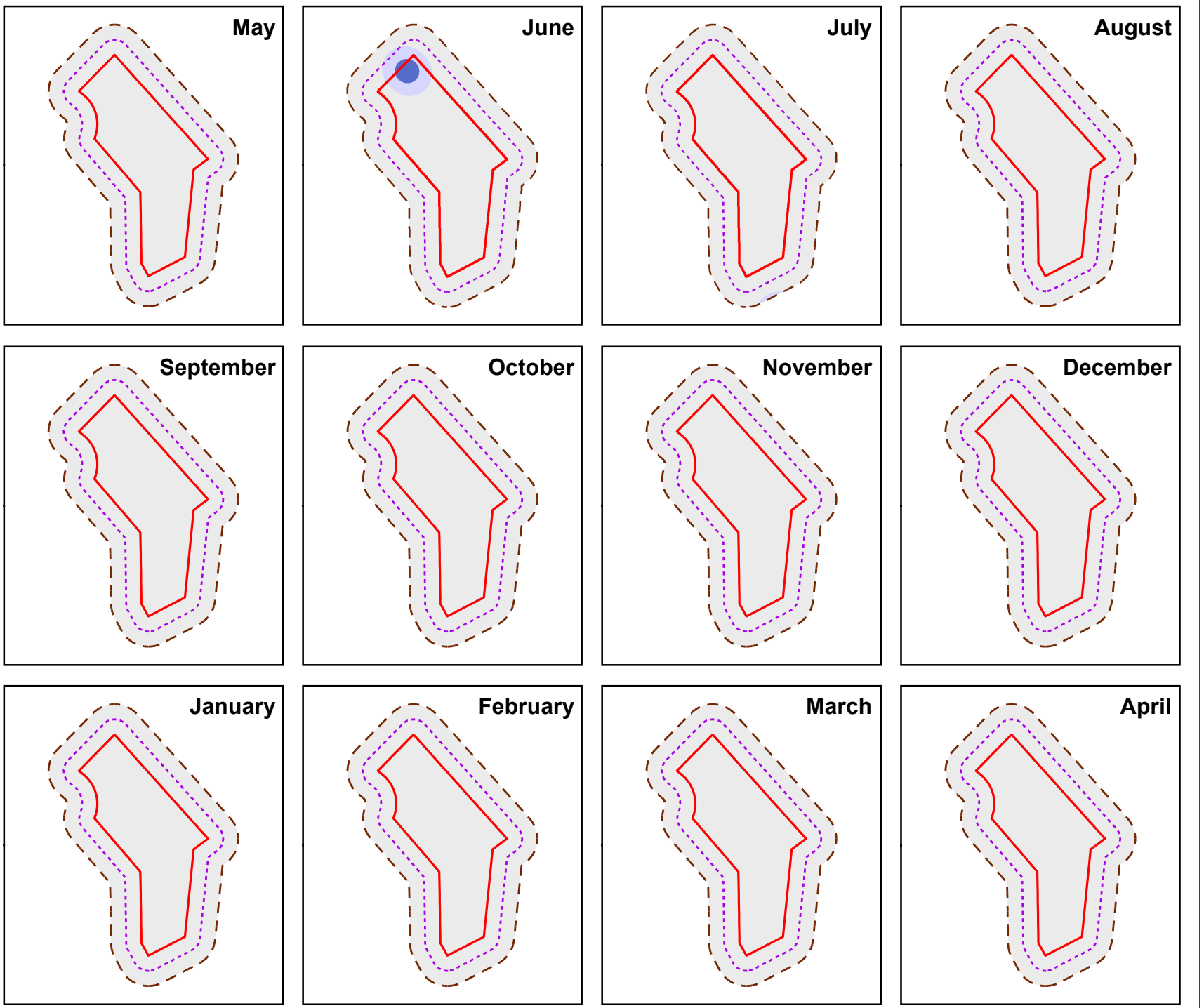
REV: N/A



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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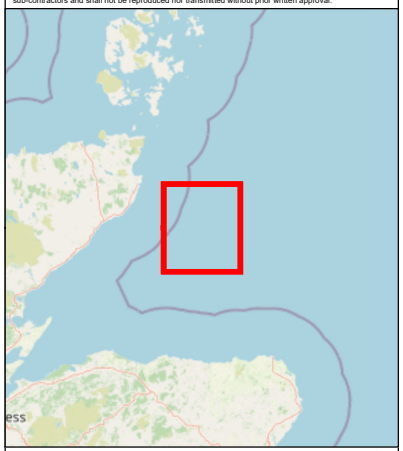

0 5 10 15 20 25 30 km

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DRAWING TITLE

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

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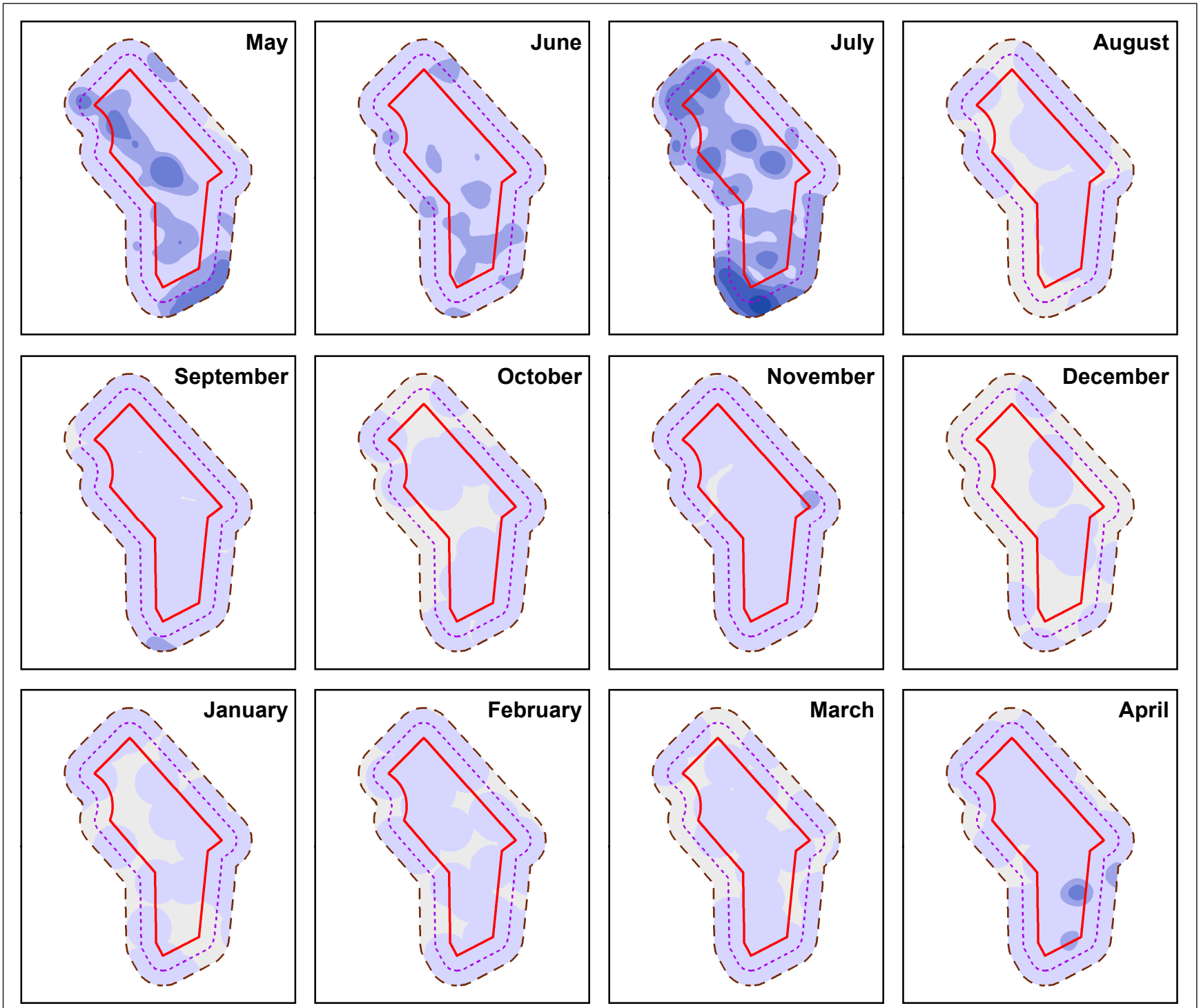
1.6 Guillemot

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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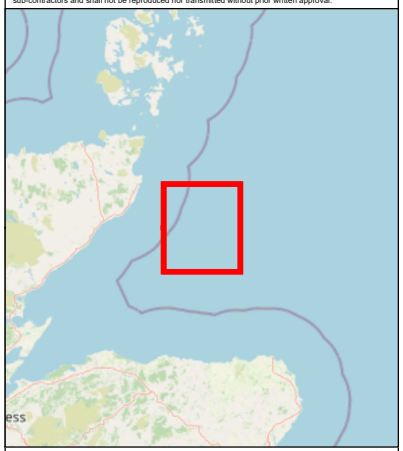

0 5 10 15 20 25 30 km

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

DRAWING TITLE

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

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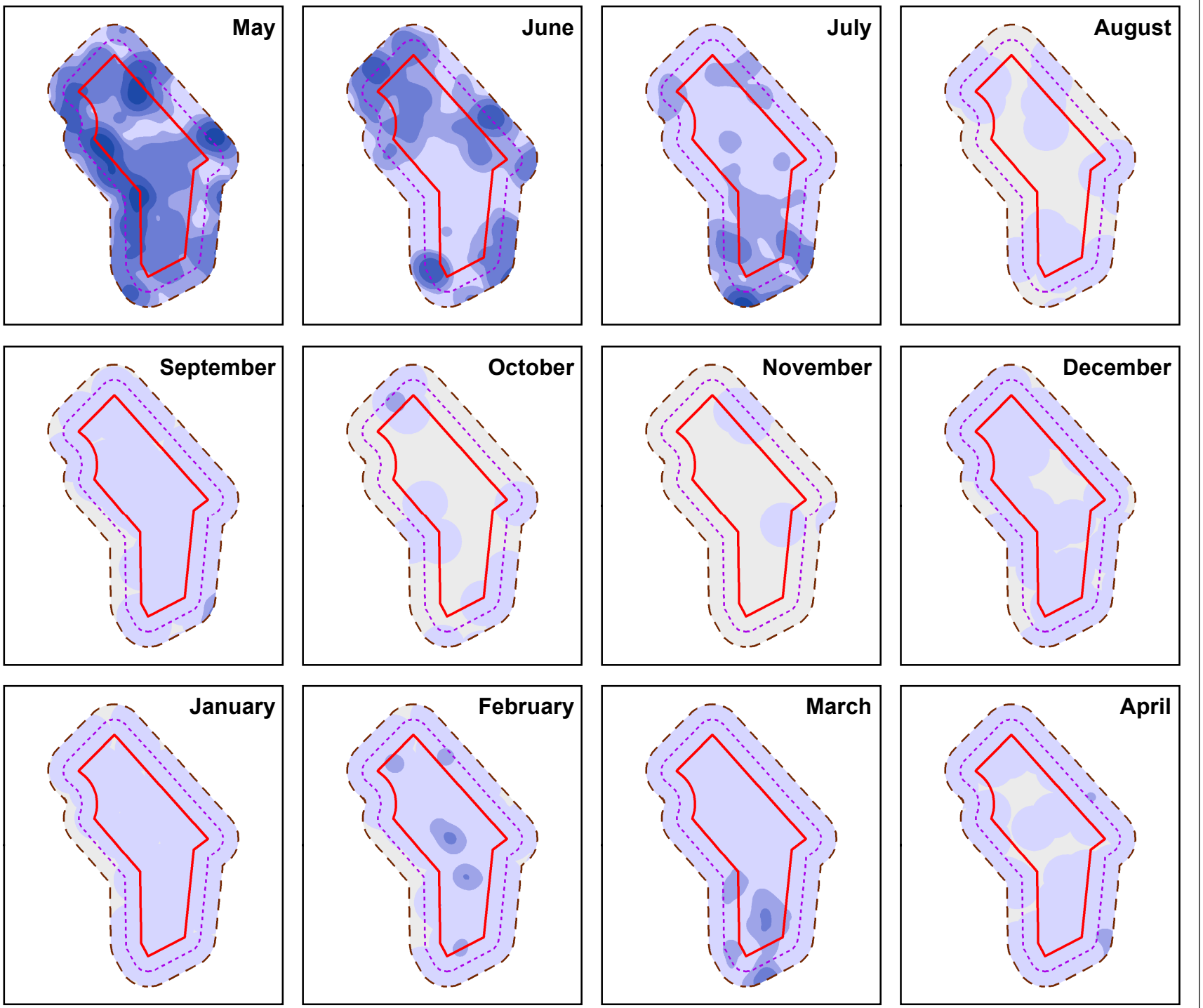
SHEET NO: 01 of 01
REV: N/A



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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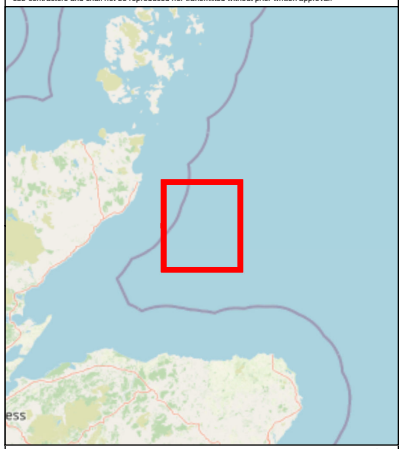

0 5 10 15 20 25 30 km

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

STATUS: Approved	SCALE: 1:700,000	
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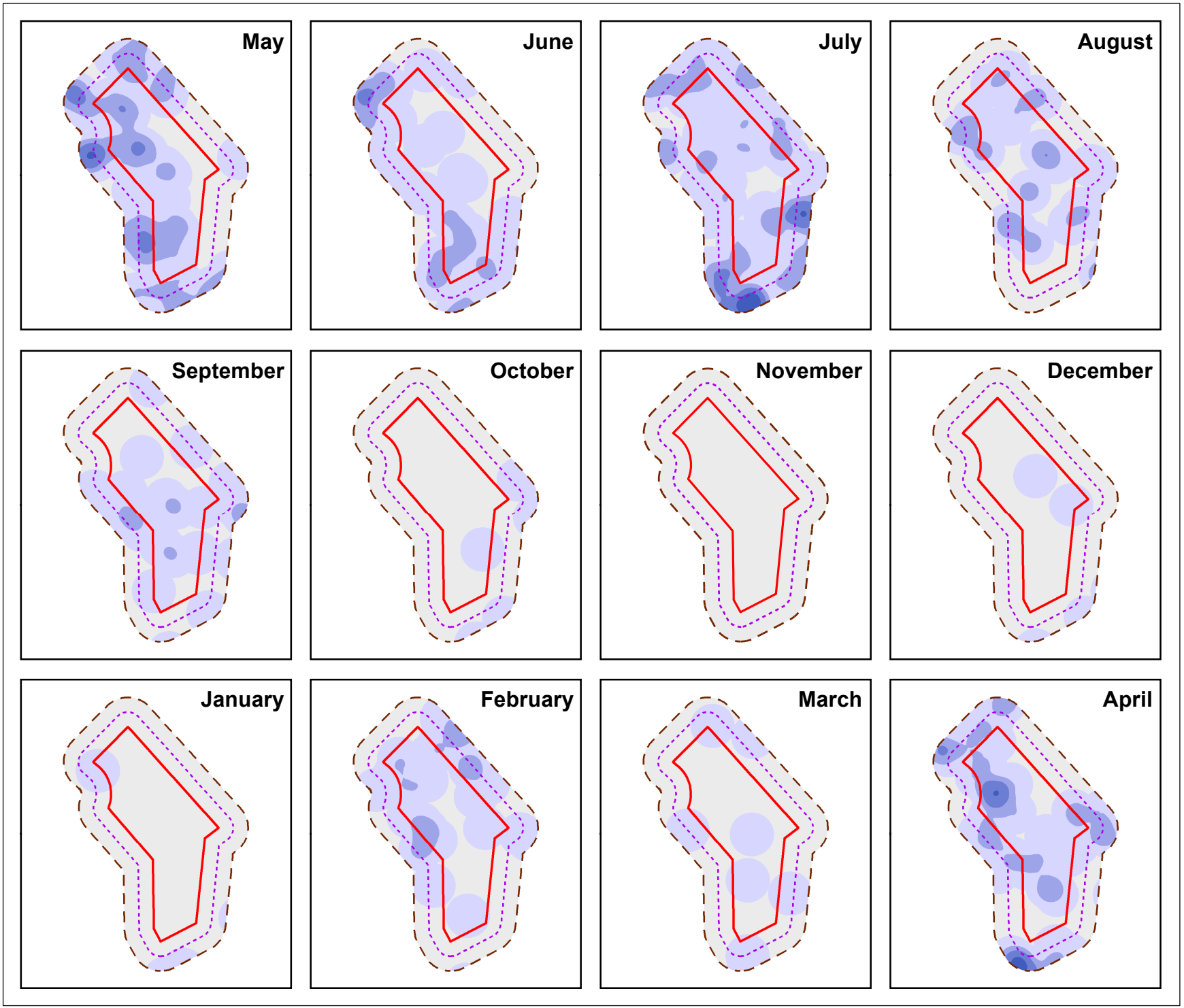
1.7 Razorbill

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.



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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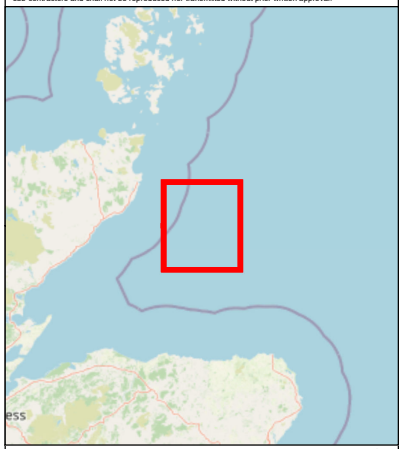

0 5 10 15 20 25 30 km

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Figure 1-11: Distribution of razorbill between May 2021 and April 2022

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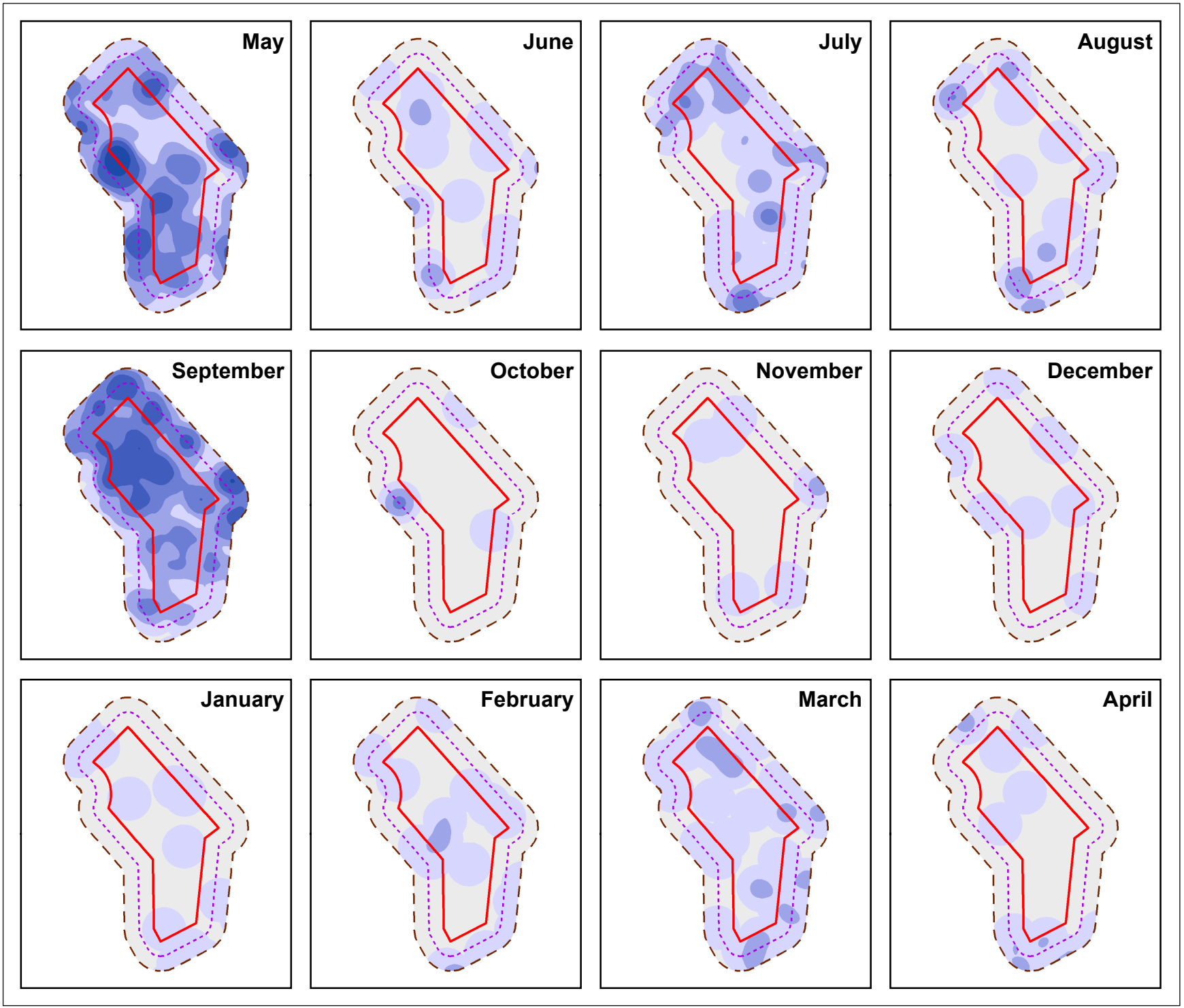

Caledonia North Site

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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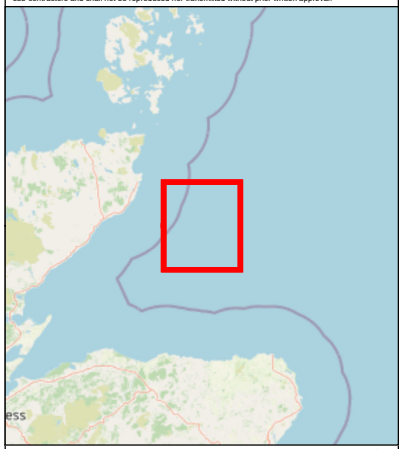

0 5 10 15 20 25 30 km

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

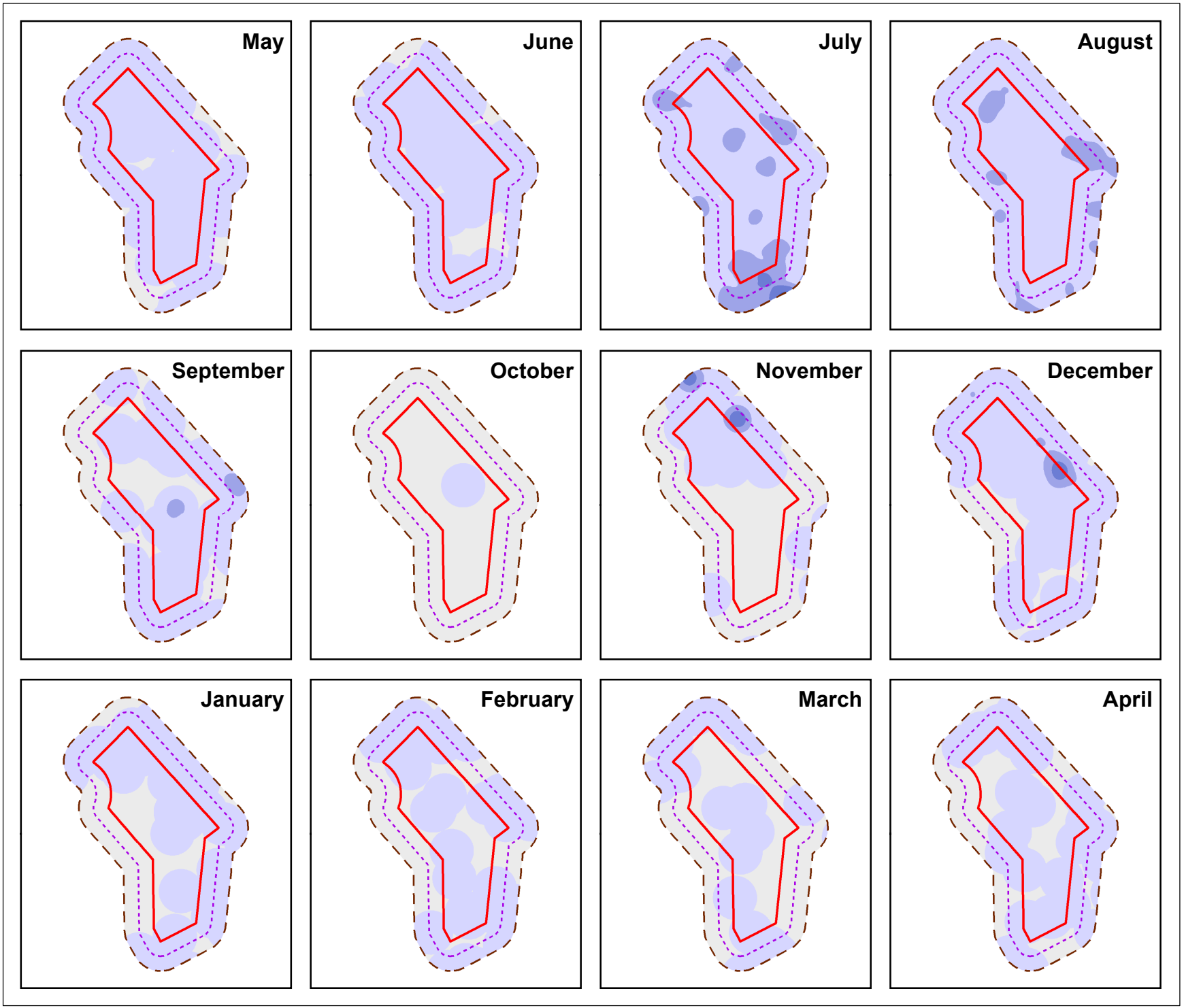
DRAWING TITLE

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.



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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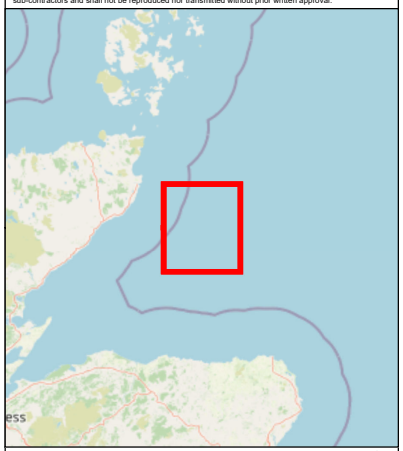

0 5 10 15 20 25 30 km

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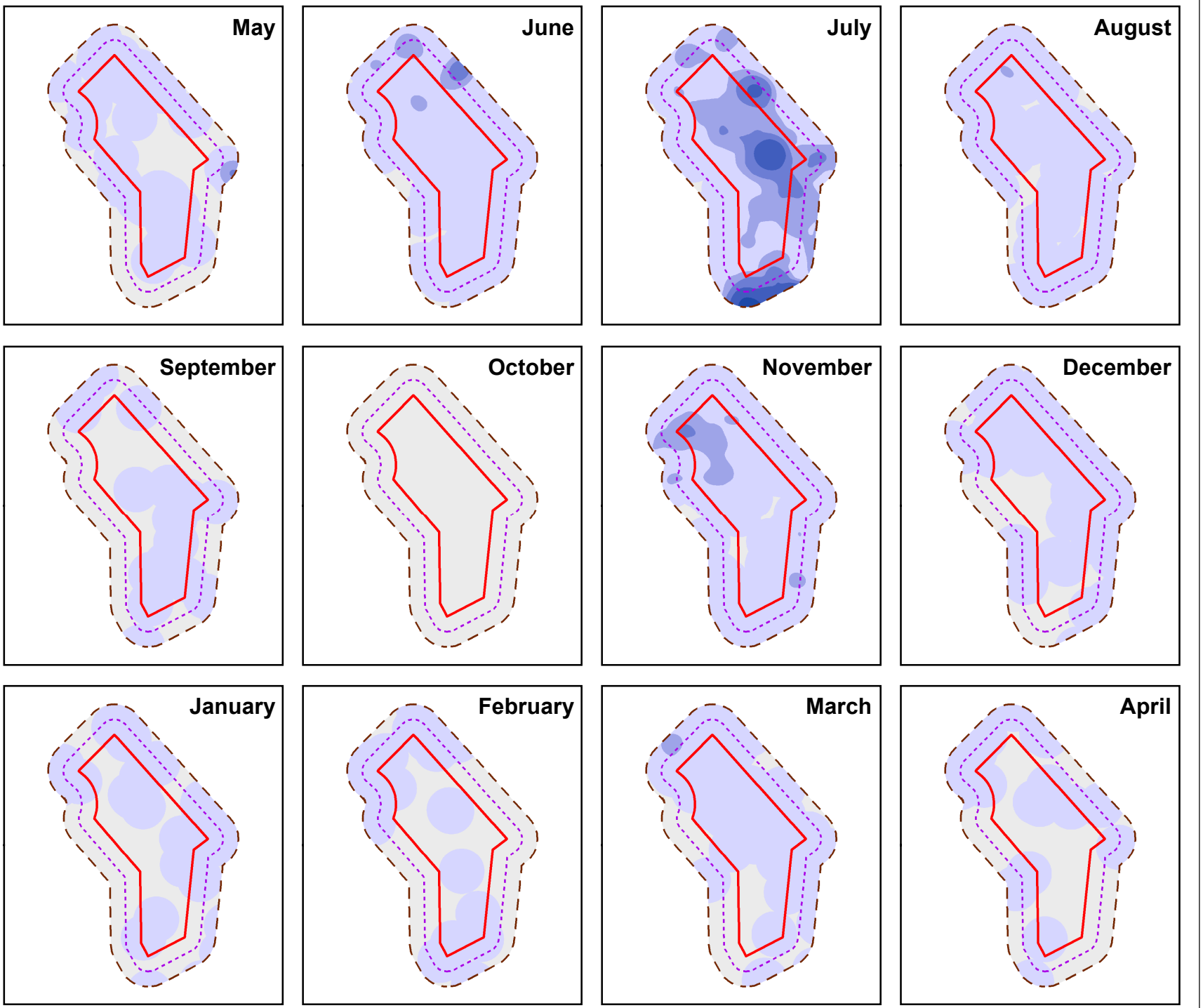
DRAWING TITLE

Figure 1-13: Distribution of fulmar 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

Fulmar Relative Density

- 0
- 0 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 100
- 100 - 240

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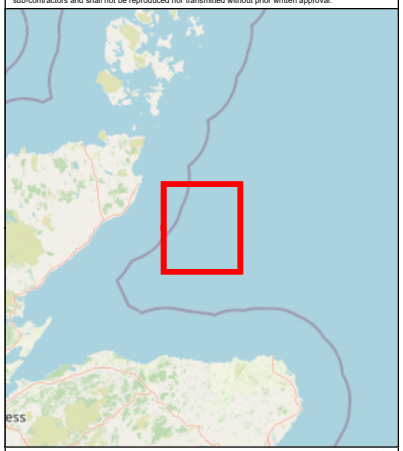

0 5 10 15 20 25 30 km

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

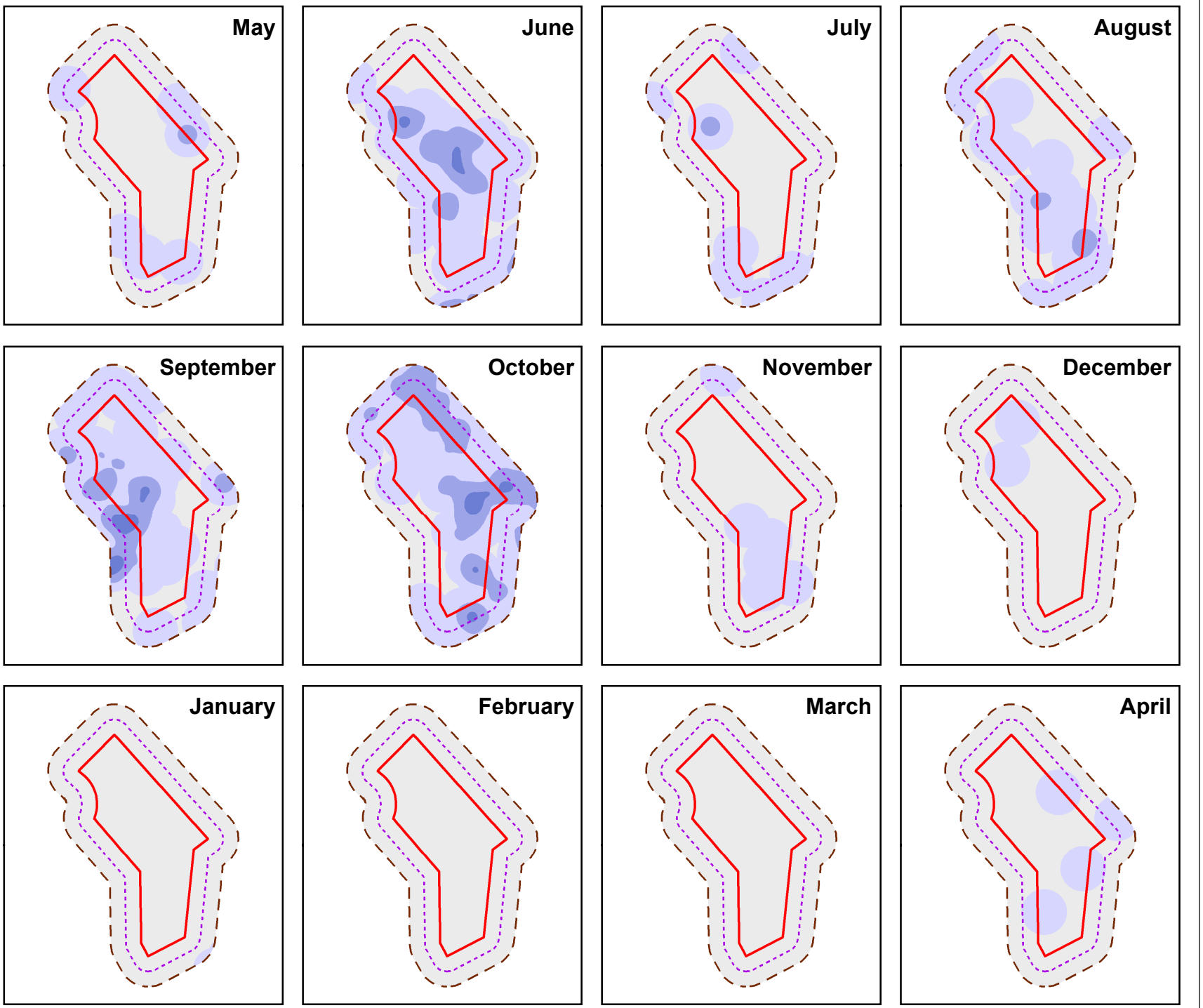
DRAWING TITLE

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

STATUS: Approved	SCALE: 1:700,000	
DRAWING NUMBER: N/A	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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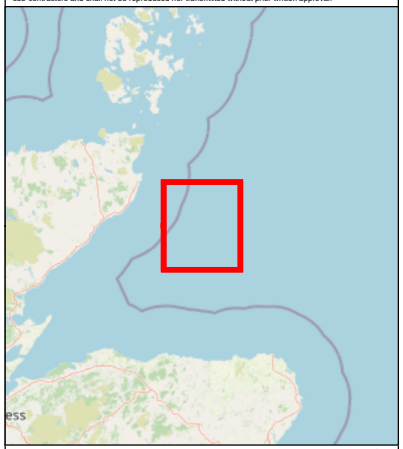

0 5 10 15 20 25 30 km

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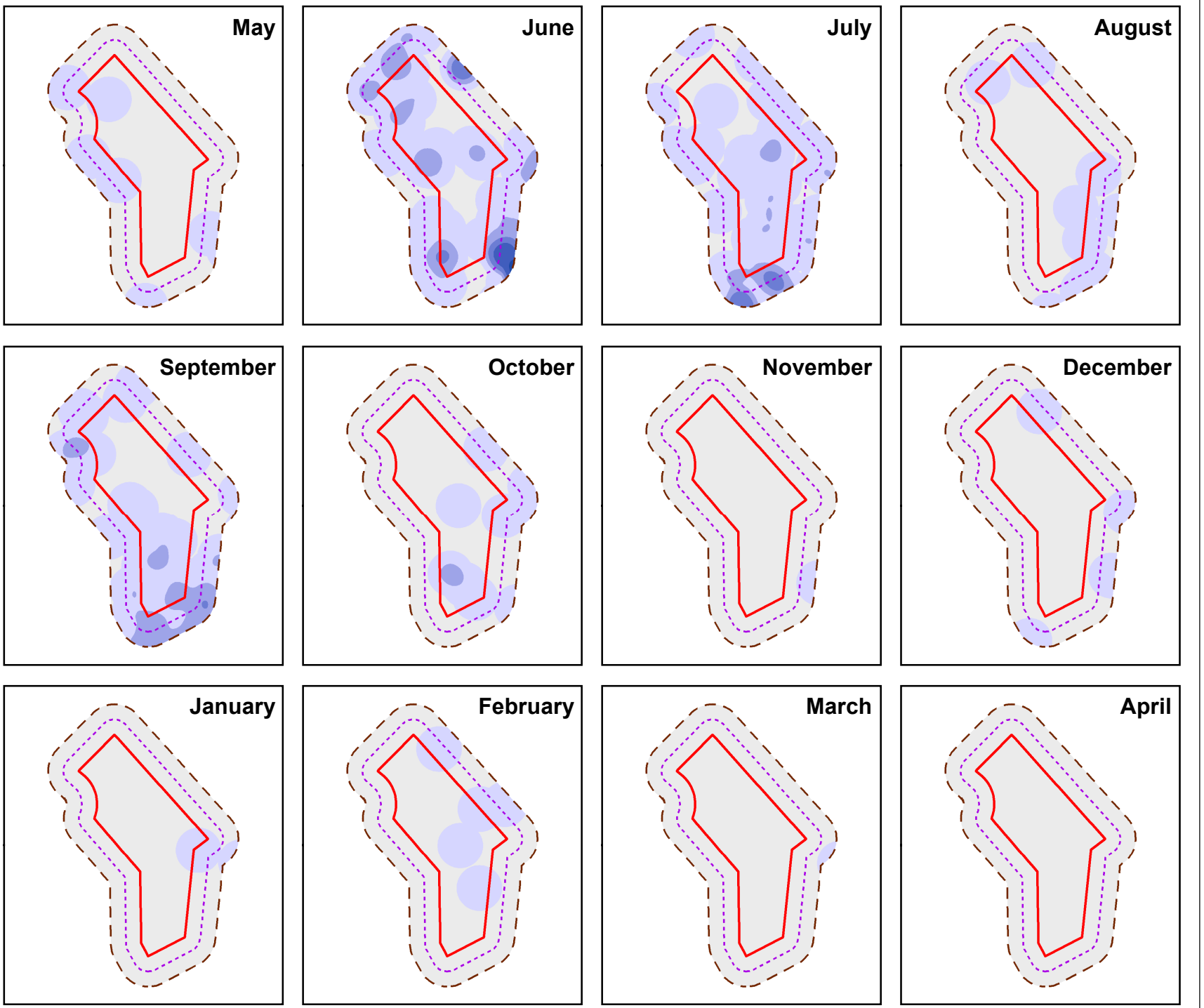
DRAWING TITLE

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



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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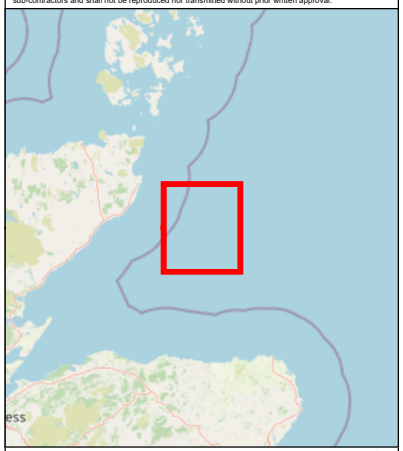

0 5 10 15 20 25 30 km

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CONTRACTOR REV: 01

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

DRAWING TITLE

Figure 1-16: Distribution of gannet between May 2022 and April 2023

STATUS: Approved

SCALE: 1:700,000

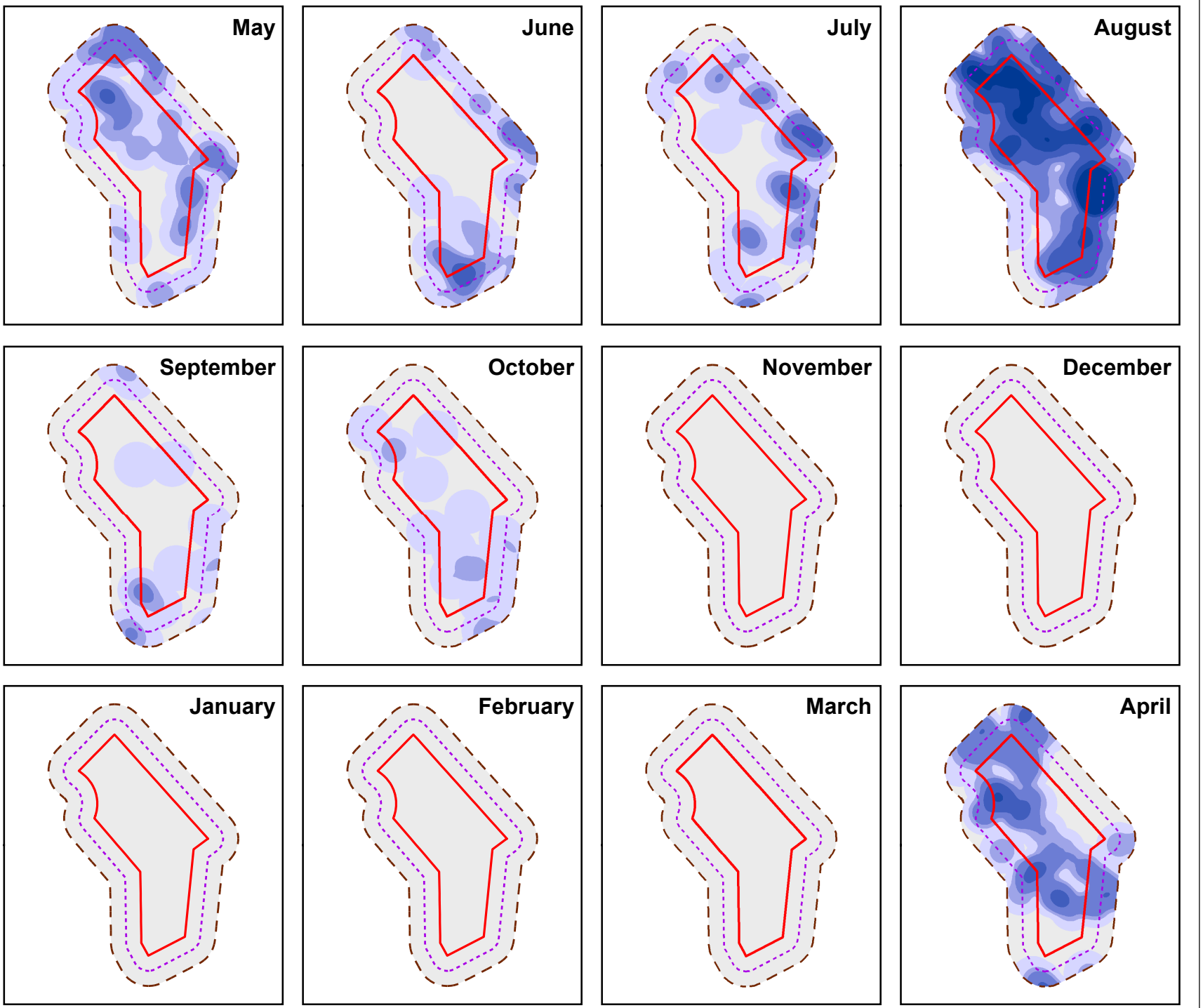
DRAWING NUMBER: N/A

SHEET NO: 01 of 01

REV: N/A

1.10 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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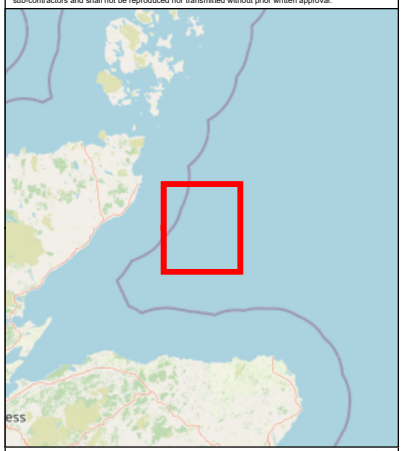

0 5 10 15 20 25 30 km

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CONTRACTOR DRAWING NO: UKCAL1_GO_WNF_ORN_MAP_0038{

CONTRACTOR REV: 01

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

DRAWING TITLE

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

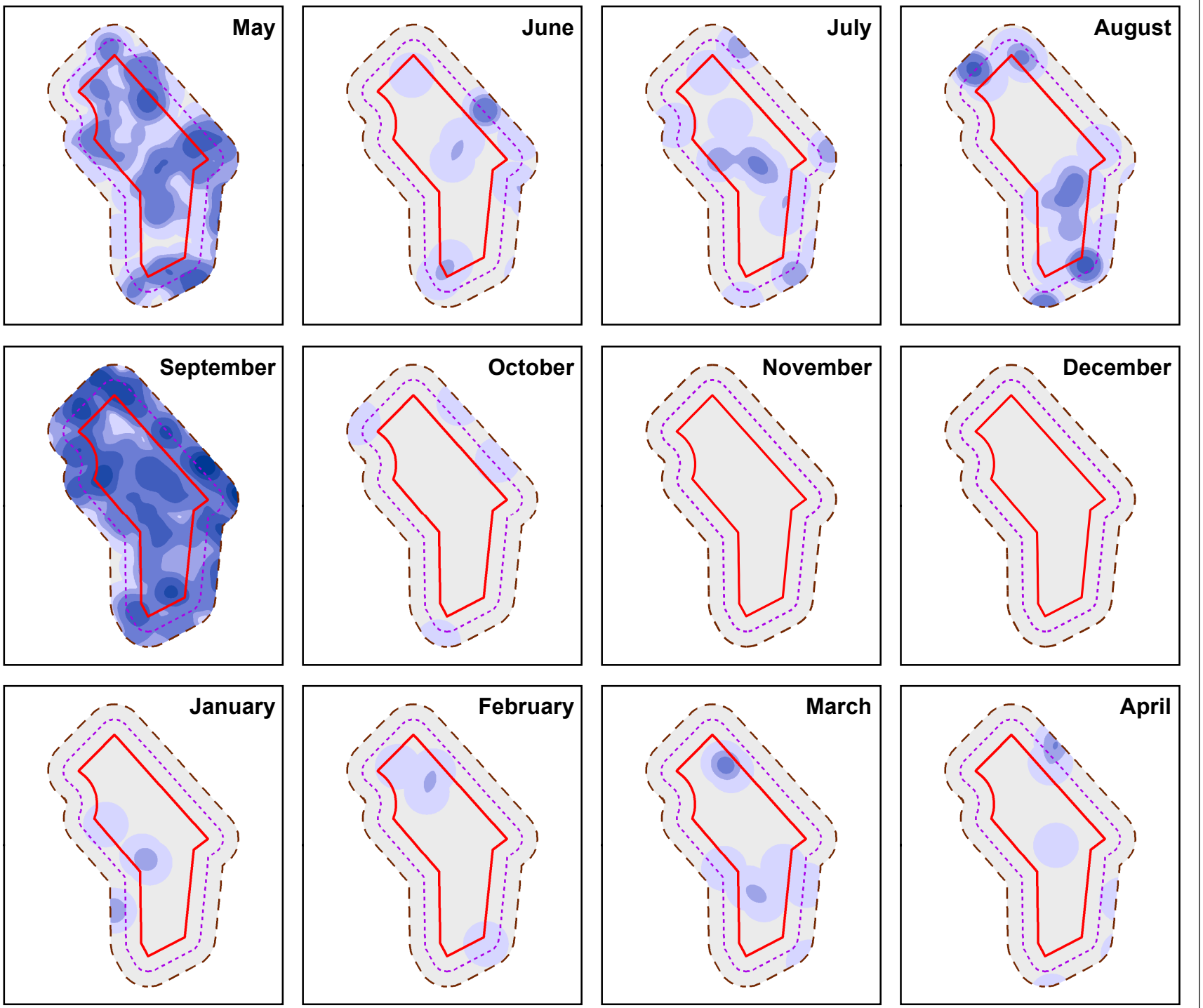
STATUS: Approved

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

Puffin Relative Density

- 0
- 0 - 1
- 1 - 2
- 2 - 5
- 5 - 10
- 10 - 15
- 15 - 20

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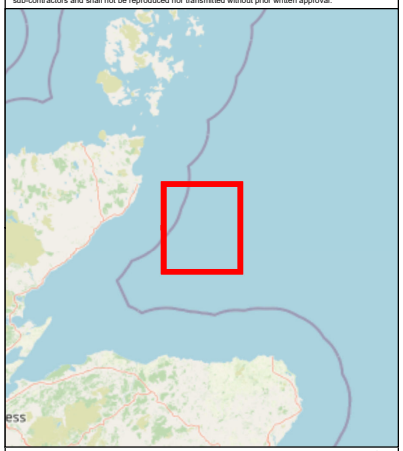

0 5 10 15 20 25 30 km

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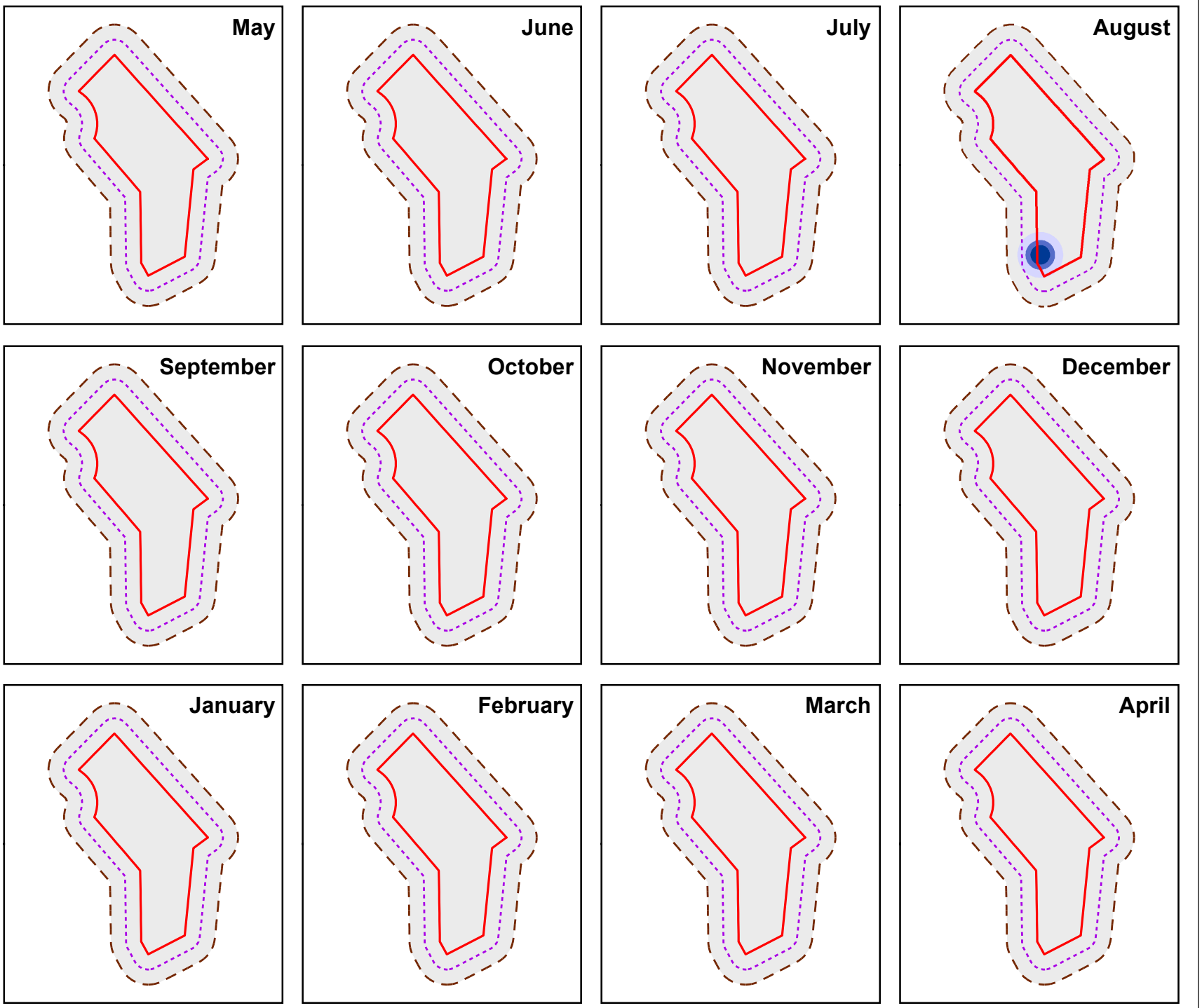
DRAWING TITLE

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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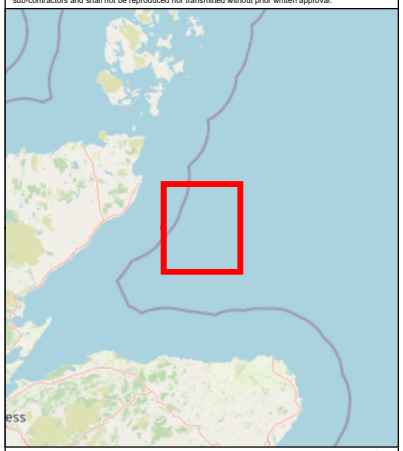

0 5 10 15 20 25 30 km

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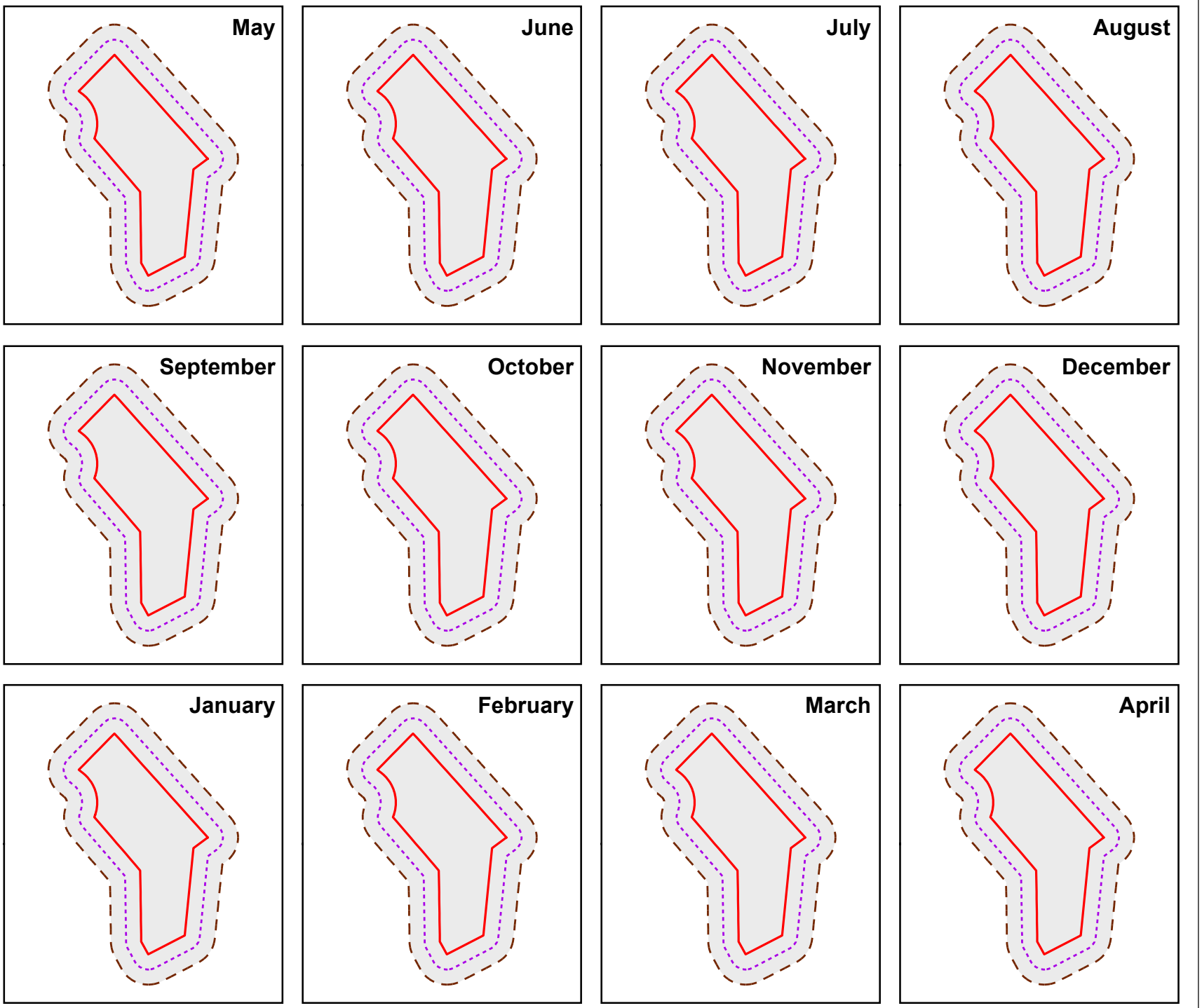
DRAWING TITLE

Figure 1-19: Distribution of common tern 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

Common tern Relative Density

0

0 - 1

1 - 2

2 - 3

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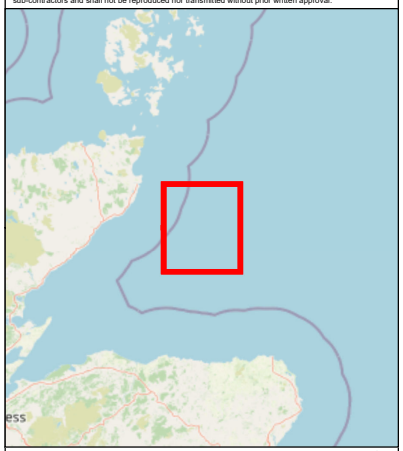

0 5 10 15 20 25 30 km

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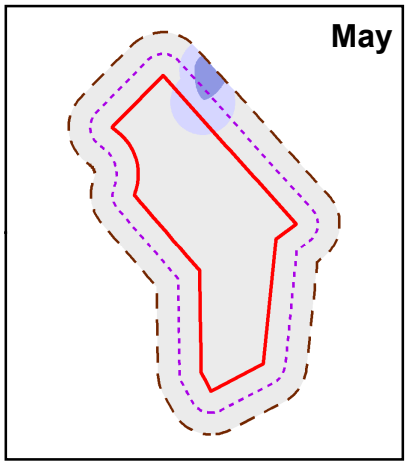
DRAWING TITLE

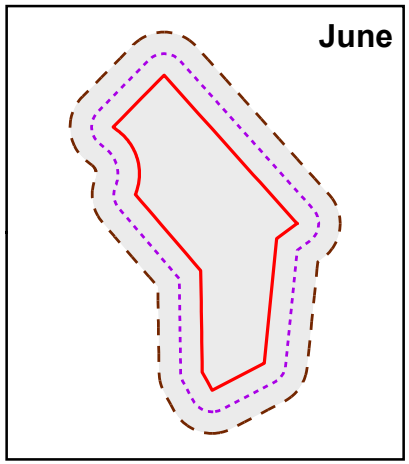
Figure 1-20: Distribution of common tern between May 2022 and April 2023

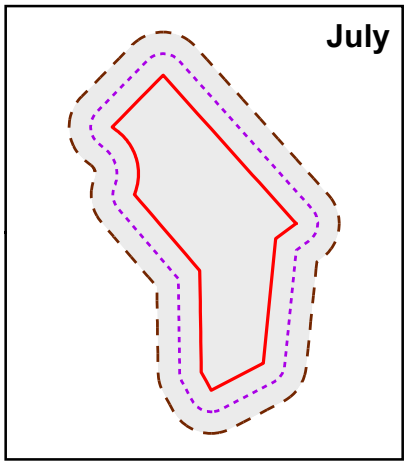
STATUS: Approved	SCALE: 1:700,000	
DRAWING NUMBER: N/A	SHEET NO: 01 of 01	REV: N/A

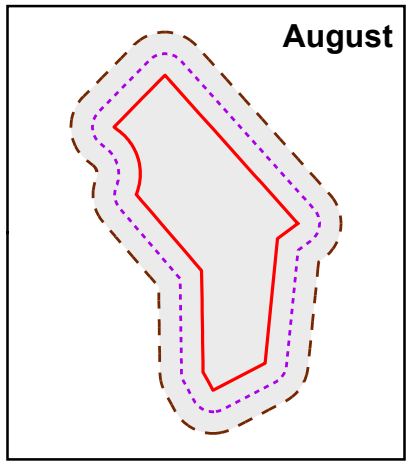
1.12 Arctic Tern

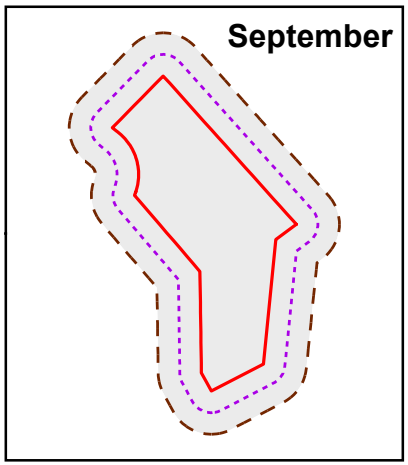
1.12.1.1 Spatial distribution maps, generated using design-based estimates, for Arctic tern throughout the Caledonia North Site (plus 2km and 4km buffers) between May 2021 and April 2022 and May 2022 and April 2023 are provided in Figure 1-21 and Figure 1-22, respectively.

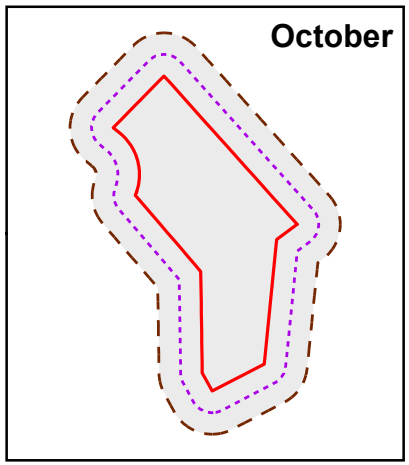


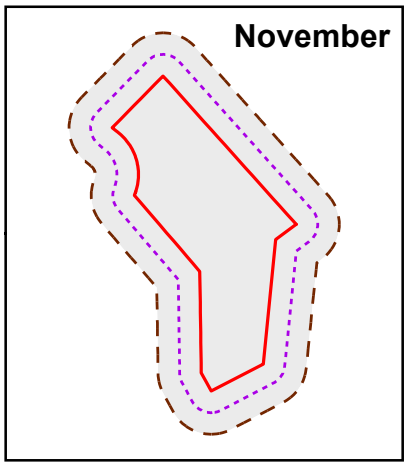


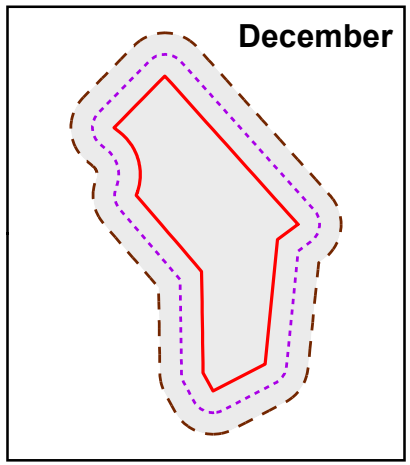


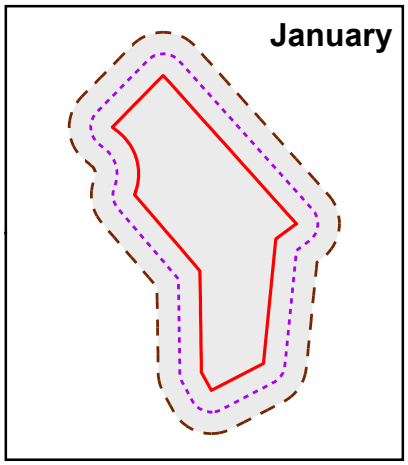


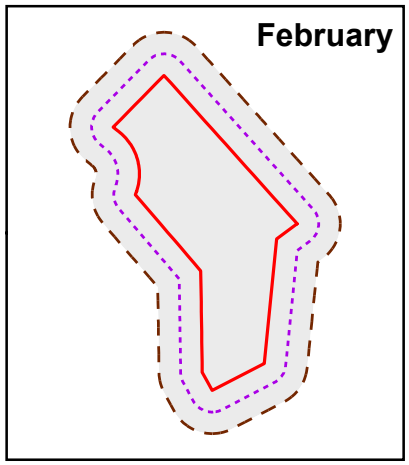


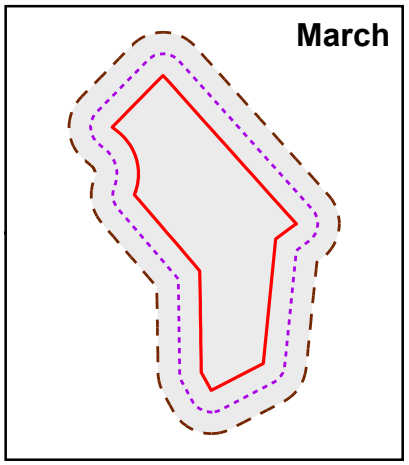


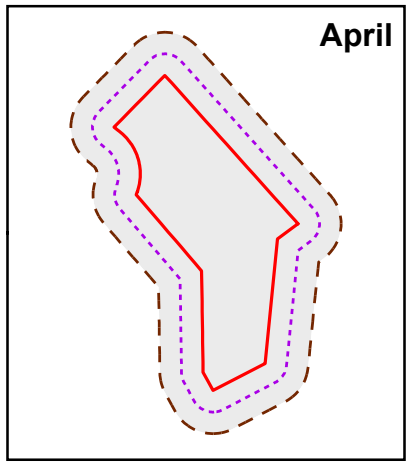












Caledonia North Site

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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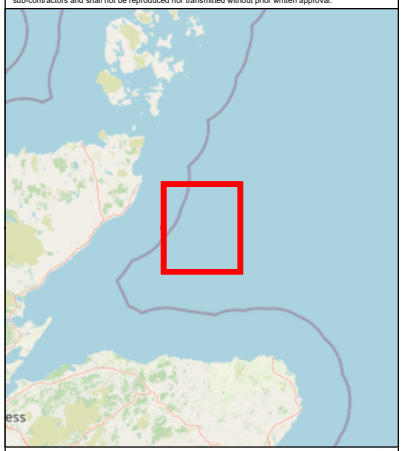

0 5 10 15 20 25 30 km

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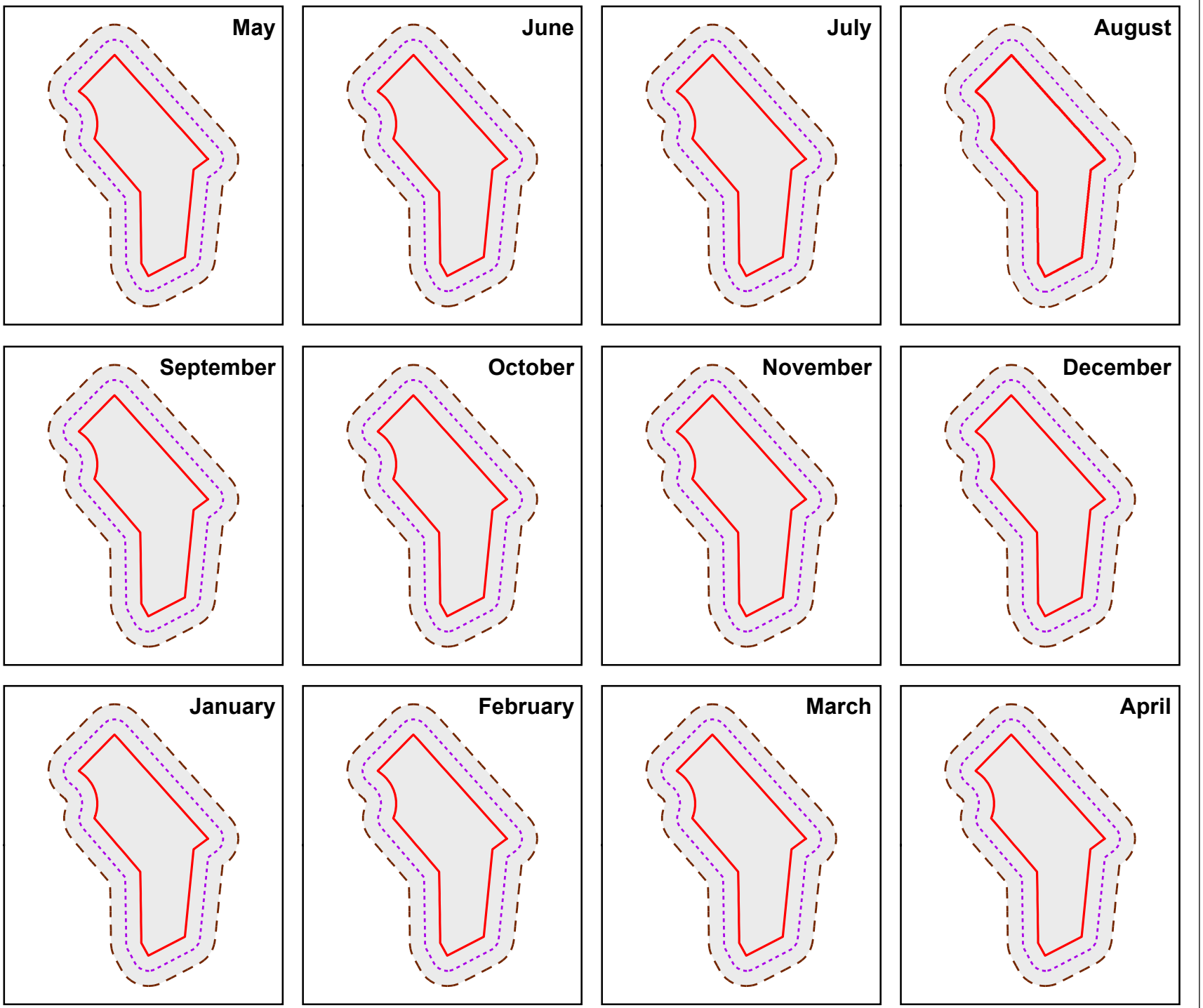
DRAWING TITLE

Figure 1-21: Distribution of arctic tern 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

Arctic tern Relative Density

0

0 - 1

1 - 2

2 - 3

3 - 4

4 - 5

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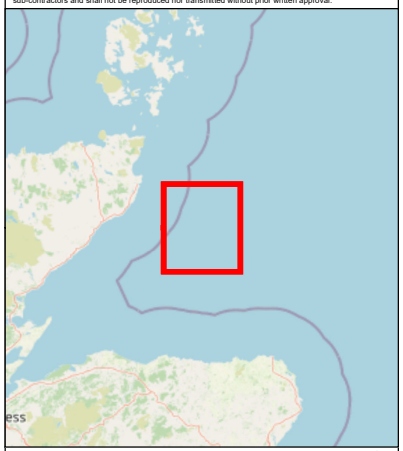

0 5 10 15 20 25 30 km

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CONTRACTOR REV: 01

GEODETIC 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

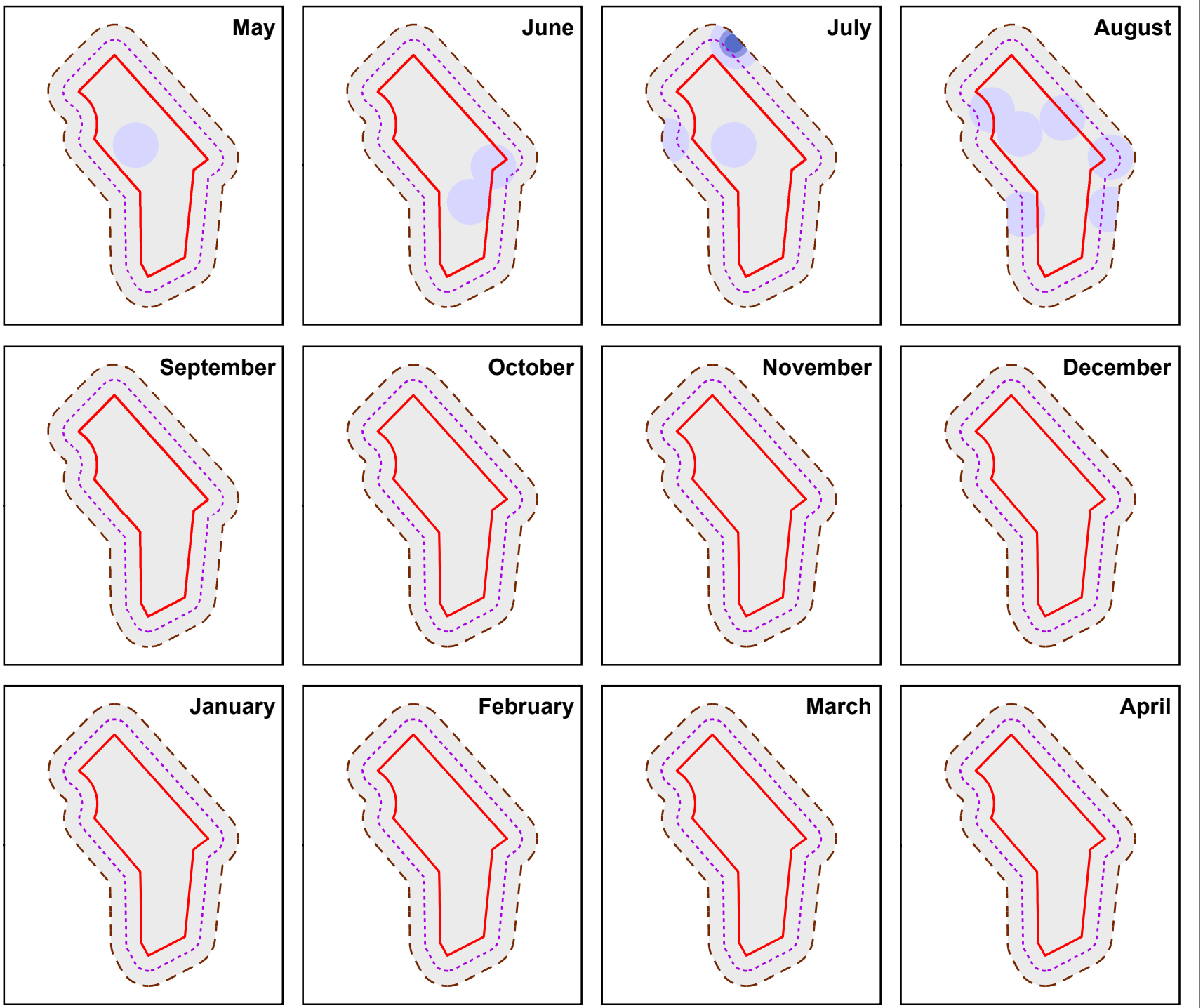
DRAWING NUMBER: N/A

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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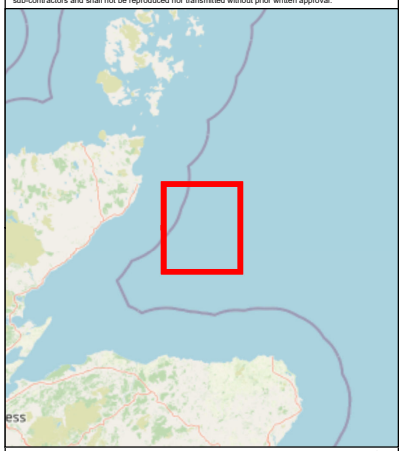

0 5 10 15 20 25 30 km

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

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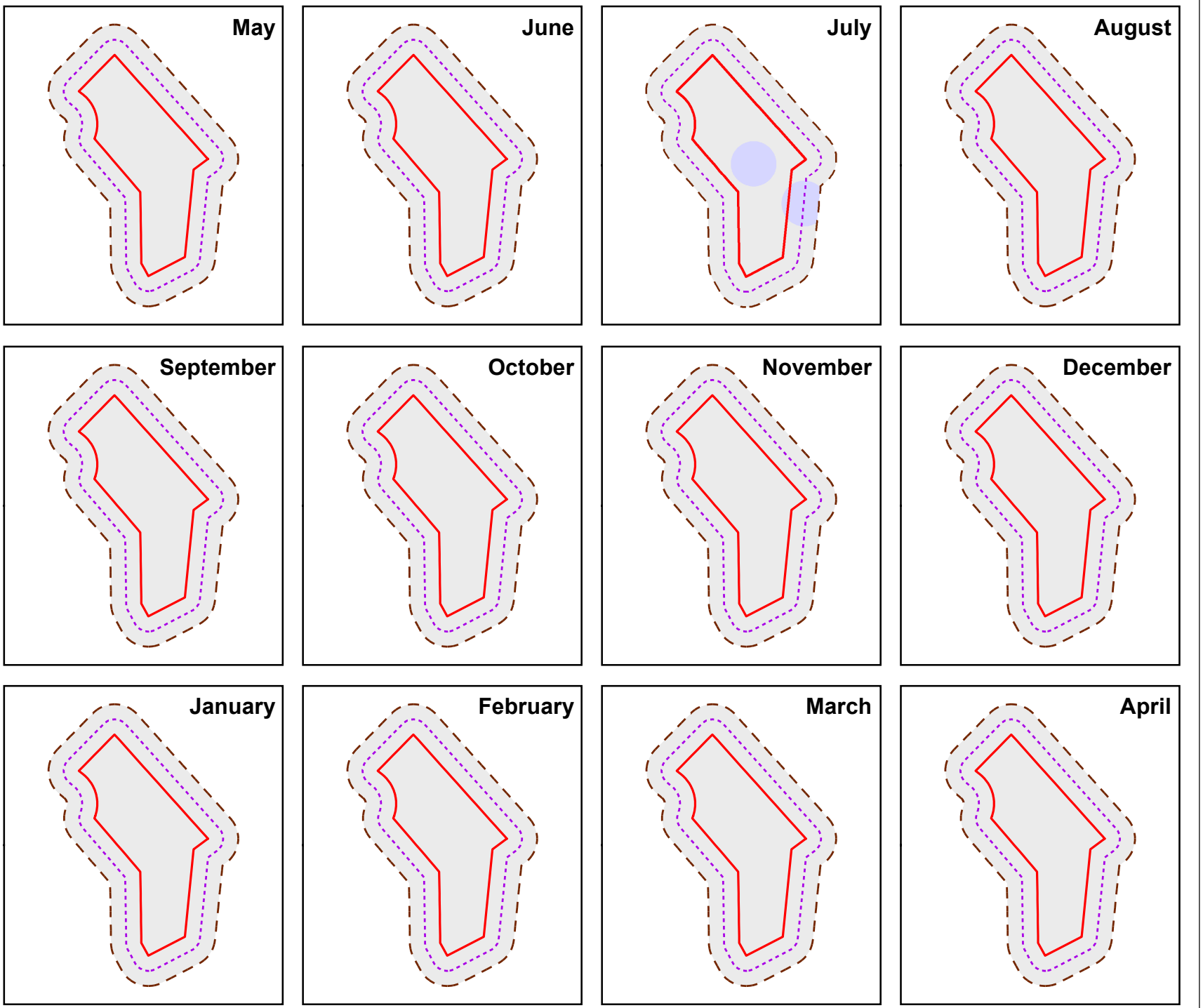
CONTRACTOR DRAWING NO: UKCAL1_GO_WNF_ORN_MAP_00404	CONTRACTOR REV: 01
GEODETIC PARAMETERS: WGS 84 / UTM zone 30N (EPSG: 32630)	

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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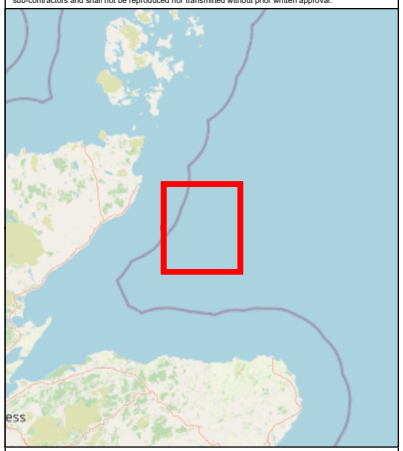

0 5 10 15 20 25 30 km

REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP
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CONTRACTOR REV: 01

GEODETIC 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

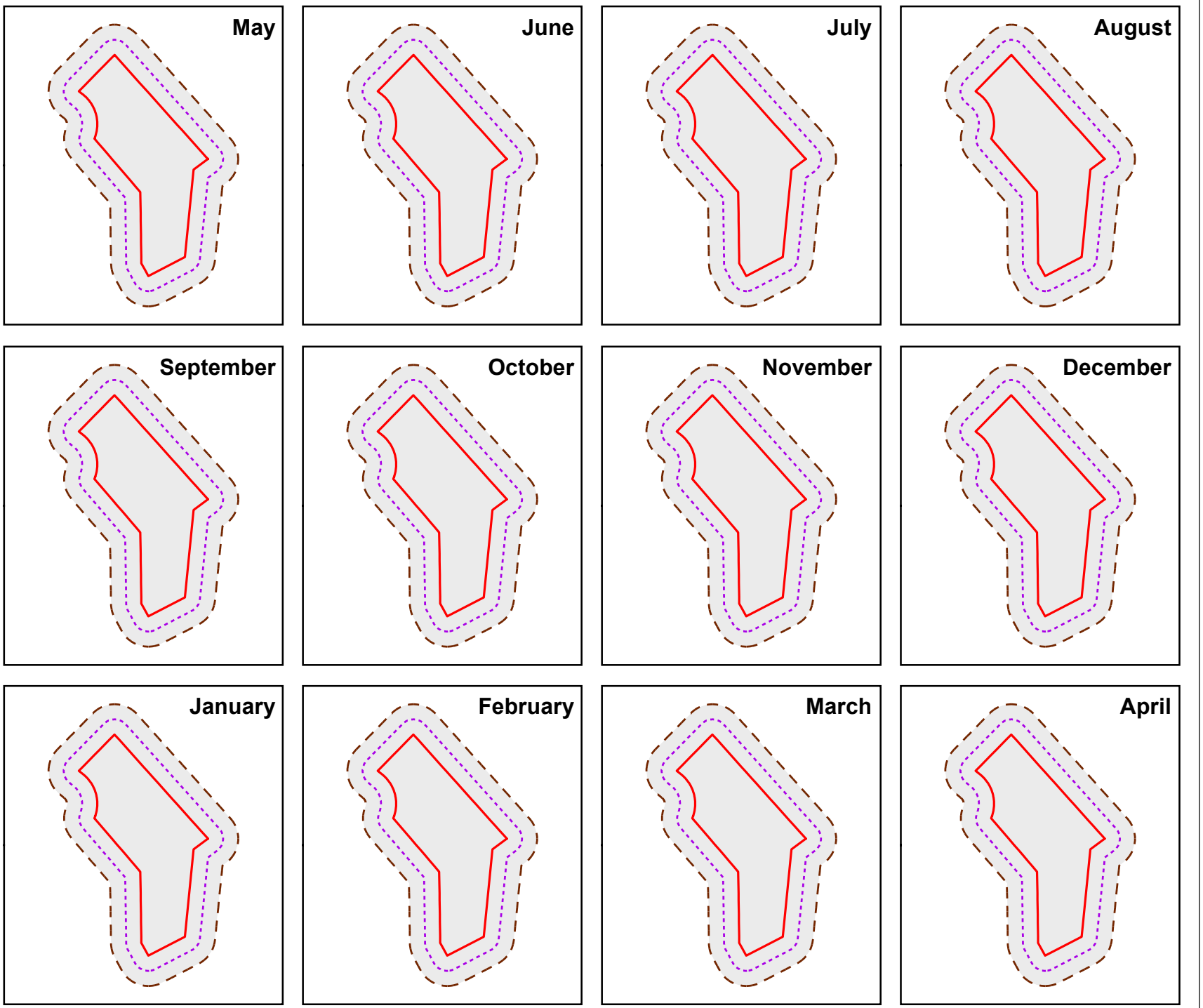
DRAWING NUMBER: N/A

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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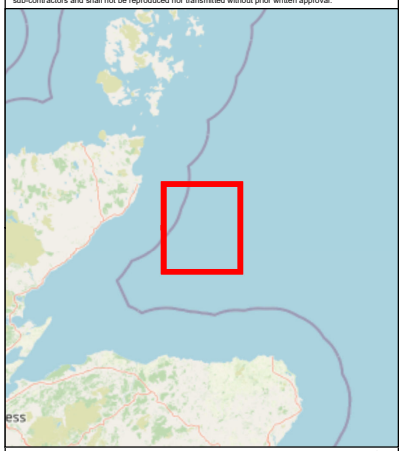

0 5 10 15 20 25 30 km

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CONTRACTOR REV: 01

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

DRAWING TITLE

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

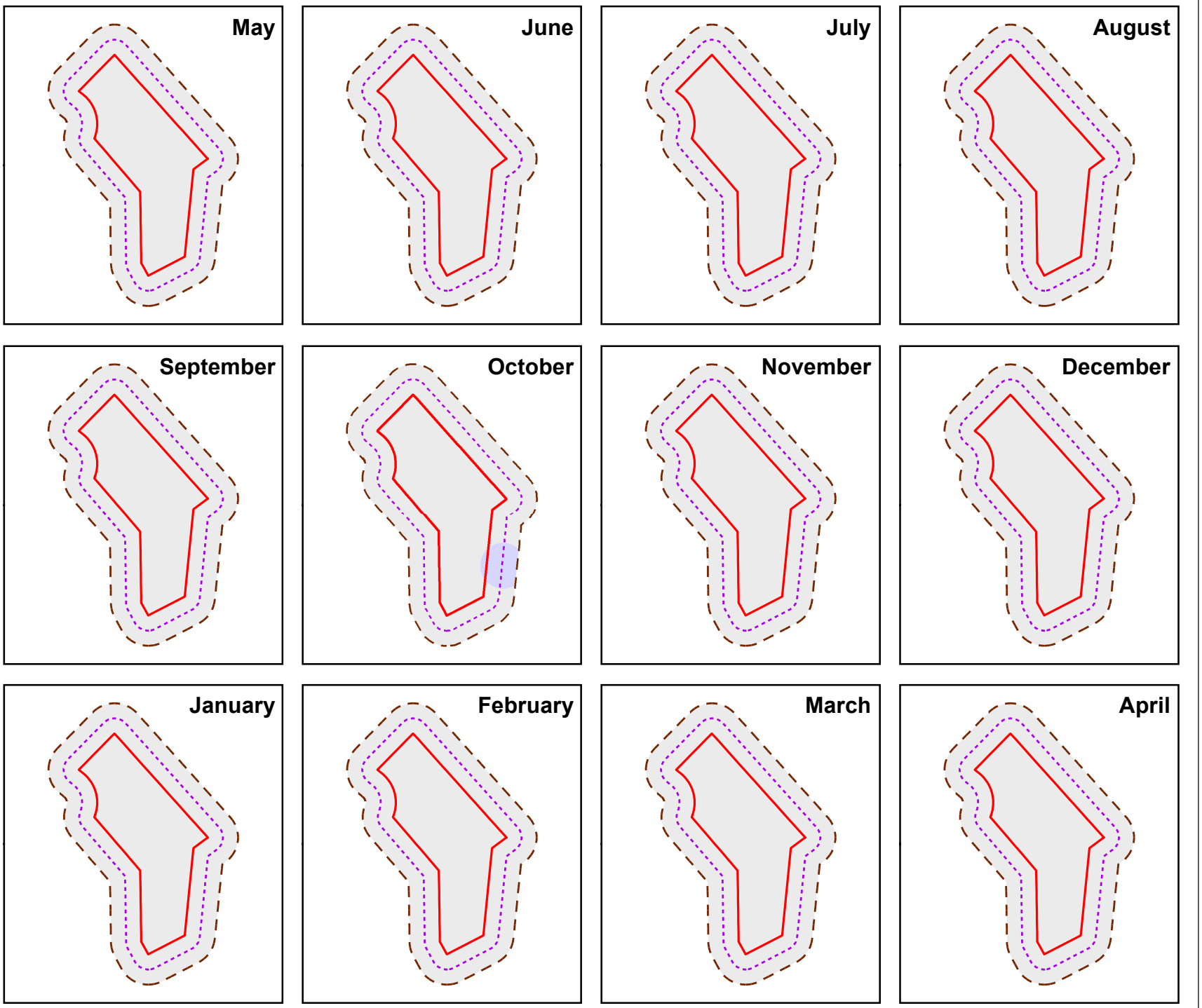
STATUS: Approved

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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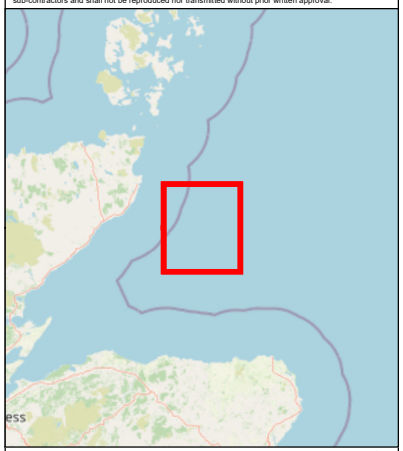

0 5 10 15 20 25 30 km

REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP
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GEODETIC 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	
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