

**Table S1.** Summary of the distances moved (straight-lines between modelled locations) and mean swim speeds of 10 southern right whales *Eubalaena australis* (SRWs) satellite-tagged in the Falkland Islands (Malvinas)<sup>1</sup>, with comparative information from other SRW telemetry studies. Data have been ordered by swim speed.

Study	Individual ID	Movement total		Mean speed (km h <sup>-1</sup> )
		Days	Distance (km)	
Zerbini et al. (2016)	121201/Helena	22.9	260	0.47
Mackay et al. (2020)	120949	32.0	645	0.84
Zerbini et al. (2016)	120947/Antenita	86.4	1,761	0.85
Zerbini et al. (2016)	120942/Zarpazo	96.2	1,970	0.85
Mackay et al. (2020)	96373	100.0	2,111	0.88
Zerbini et al. (2016)	120950/Papillon	236.8	5,675	1.00
Mackay et al. (2020)	120945	57.0	1,858	1.36
Vermeulen et al. (2023)	221422	214.0	6,996	1.36
Zerbini et al. (2016)	121197/Borboleta	97.7	3,446	1.47
Zerbini et al. (2016)	121191/Seductora	88.7	3,198	1.50
<b>This study</b>	<b>Elmo</b>	<b>103.0</b>	<b>3,777</b>	<b>1.53</b>
Vermeulen et al. (2023)	221420	259.0	9,576	1.54
<b>This study</b>	<b>Sandy</b>	<b>100.3</b>	<b>3,805</b>	<b>1.58</b>
Zerbini et al. (2016)	112728/Eclipse	94.6	3,715	1.64
Mackay et al. (2020)	96374	150.0	5,953	1.65
Vermeulen et al. (2023)	222172	165.0	6,597	1.67
Vermeulen et al. (2023)	221423	369.0	15,288	1.73
Kennedy et al. (2023)	Braveheart	238.0	9,885	1.73
<b>This study</b>	<b>Beatrice</b>	<b>113.5</b>	<b>5,083</b>	<b>1.87</b>
<b>This study</b>	<b>Walter*</b>	<b>121.8</b>	<b>5,496</b>	<b>1.88</b>
Zerbini et al. (2016)	84498/Buena Onda	125.6	6,028	2.00
<b>This study</b>	<b>Kelpie*</b>	<b>122.0</b>	<b>5,917</b>	<b>2.02</b>
Kennedy et al. (2023)	Annenkov	117.0	5,818	2.07
<b>This study</b>	<b>Dora*</b>	<b>212.5</b>	<b>11,521</b>	<b>2.26</b>
Mackay et al. (2020)	120944	29.0	1,663	2.39
Zerbini et al. (2016)	112730/Atrevida	118.6	6,828	2.40
Zerbini et al. (2016)	121198/Primavera	10.6	633	2.50
<b>This study</b>	<b>Elizabeth</b>	<b>12.8</b>	<b>775</b>	<b>2.53</b>
<b>This study</b>	<b>Pebble</b>	<b>162.0</b>	<b>9,911</b>	<b>2.55</b>
Mackay et al. (2020)	98103	103.0	6,389	2.58
<b>This study</b>	<b>Byron</b>	<b>239.3</b>	<b>15,375</b>	<b>2.68</b>
<b>This study</b>	<b>Frosty</b>	<b>106.0</b>	<b>8,082</b>	<b>3.18</b>
Zerbini et al. (2016)	84482/Barefluke	71.0	5,520	3.24
Zerbini et al. (2016)	87637/Blubber	32.6	2,562	3.27

\* Three tags deployed in this study had transmission interruptions between the first and final modelled locations; transmission gaps were omitted from the distance and swim speed calculations.

<sup>1</sup> Since 1965 the nomenclature used by the United Nations for statistical processing is Falkland Islands (Malvinas), which acknowledges the dispute that exists concerning the sovereignty of the Islands (UN Directive ST/CS/SER.A/42, 16 December 1965).

**Table S2.** Estimated swim speeds of 10 satellite-tracked southern right whales *Eubalaena australis* (SRWs) calculated using: (1) the modelled dataset (predicted 6 hr location intervals) for 16 example periods of continuous directed movements (i.e. behavioural state 3, BS3) of  $\geq 3$  days duration between areas; and (2) the unfiltered dataset (all ARGOS locations) for the equivalent date/time periods to (1). Migrations are defined here as movements that terminate at a calving/nursing area. Movements are other periods of sustained BS3 likely associated with travel to, or between, foraging areas. Information relating to sustained movements or travel from other SRW studies is included for comparison, and those sources should be consulted for details of their modelling methods. Data are ordered by swim speed of the modelled dataset. FIWG=Falkland Islands (Malvinas)<sup>2</sup> wintering ground; NESS=North-east Scotia Sea; PV=Peninsula Valdés.

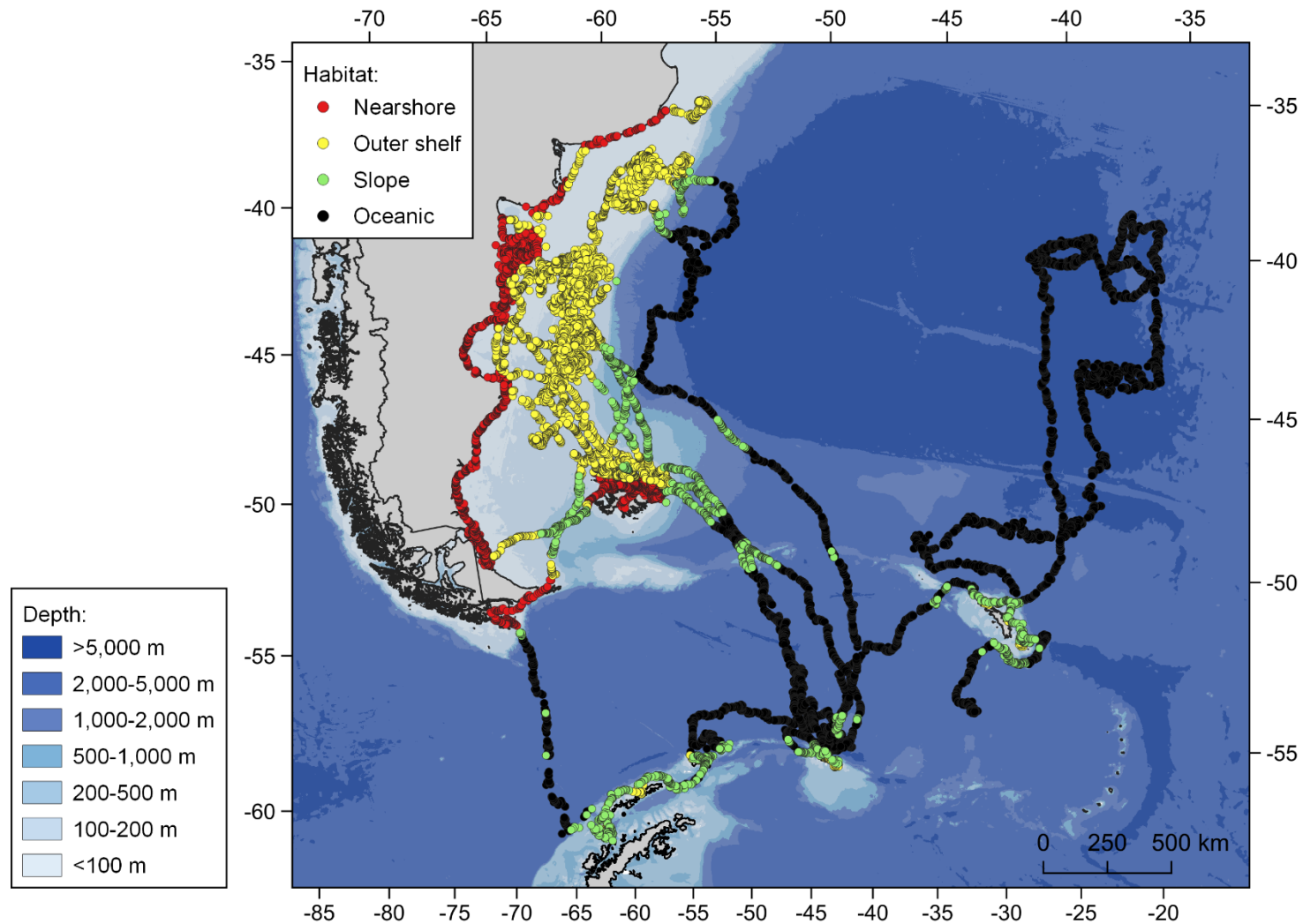
Study	Individual ID	Movement description		Unfiltered dataset				Modelled datasets			
		Category	Detailed	Distance (km)	Days	Speed (km day <sup>-1</sup> )	Speed (km h <sup>-1</sup> )	Distance (km)	Days	Speed (km day <sup>-1</sup> )	Speed (km h <sup>-1</sup> )
Mackay et al. (2020)	120945	Travel	–	–	–	–	–	–	–	–	2.0
Mackay et al. (2020)	96373	Travel	–	–	–	–	–	–	–	–	2.5
Kennedy et al. (2023)	Annenkov	Movement	Antarctica to Argentine Basin	–	–	–	–	2,368.0	37.0	64.0	2.7
Mackay et al. (2020)	96374	Travel	–	–	–	–	–	–	–	–	2.9
Mackay et al. (2020)	120944	Travel	–	–	–	–	–	–	–	–	2.9
Mackay et al. (2020)	98103	Travel	–	–	–	–	–	–	–	–	3.0
This study	Byron	Movement	NESS to Argentine Basin	667.1	5.7	116.8	4.87	503.2	5.8	87.5	3.6
Kennedy et al. (2023)	Braveheart	Migration	Migration (NESS to South America)	–	–	–	–	2,548.0	26.0	98.0	4.1
This study	Elizabeth	Migration	FIWG to PV	555.2	4.2	132.8	5.53	427.6	4.3	100.6	4.2
This study	Byron	Movement	South Orkney to NESS	1,646.9	10.1	162.7	6.78	1,063.2	10.3	103.7	4.3
Mate et al. (2011)	839	Movement	South Africa to SE Atlantic	–	–	–	–	2,468.0	23.4	105.5	4.4
This study	Beatrice	Movement	PV to Patagonian Shelf	742.6	5.2	144.0	6.00	571.7	5.3	108.9	4.5
This study	Byron	Movement	FIWG to South Orkney	2,082.8	14.5	143.8	5.99	1,585.8	14.5	109.4	4.6
This study	Kelpie	Movement	FIWG to Patagonian Shelf	1,934.8	12.6	153.6	6.40	1,400.2	12.8	109.8	4.6
Mackay et al. (2020)	120949	Travel	–	–	–	–	–	–	–	–	4.9
This study	Pebble	Movement	FIWG to South Orkney	1,163.5	7.0	166.8	6.95	911.6	7.5	121.5	5.1
Mate et al. (2011)	848	Movement	South Africa to SE Atlantic	–	–	–	–	1,534.0	12.5	122.7	5.1
This study	Sandy	Migration	FIWG to PV	1,373.6	7.9	173.1	7.21	951.4	7.8	122.8	5.1
This study	Frosty	Movement	Antarctica to Chile	1,241.6	6.9	178.6	7.44	871.7	7.0	124.5	5.2
This study	Frosty	Movement	FIWG to South Orkney	1,020.1	6.2	163.9	6.83	783.8	6.3	125.4	5.2

<sup>2</sup> Since 1965 the nomenclature used by the United Nations for statistical processing is Falkland Islands (Malvinas), which acknowledges the dispute that exists concerning the sovereignty of the Islands (UN Directive ST/CS/SER.A/42, 16 December 1965).

Study	Individual ID	Movement description		Unfiltered dataset				Modelled datasets			
		Category	Detailed	Distance (km)	Days	Speed (km day <sup>-1</sup> )	Speed (km h <sup>-1</sup> )	Distance (km)	Days	Speed (km day <sup>-1</sup> )	Speed (km h <sup>-1</sup> )
This study	Frosty	Movement	Chile to Argentine Basin	3,028.0	13.4	226.6	9.44	1,708.3	13.5	126.5	5.3
This study	Pebble	Movement	South Orkney to Patagonian Shelf	2,601.3	15.2	171.5	7.14	1,970.2	15.3	129.2	5.4
This study	Beatrice	Migration	FIWG to PV	1,383.8	7.5	185.2	7.72	974.3	7.5	129.9	5.4
This study	Dora	Migration	Migration (FIWG to South America)	731.8	4.2	175.4	7.31	555.4	4.3	130.7	5.4
This study	Walter	Migration	FIWG to PV	596.4	3.6	167.4	6.97	493.4	3.8	131.6	5.5
This study	Elmo	Migration	FIWG to PV	1,038.9	5.5	187.5	7.81	724.5	5.5	131.7	5.5
Mate et al. (2011)	836	Movement	South Africa to SE Atlantic	–	–	–	–	1,285.0	9.4	136.7	5.7
Mate et al. (2011)	23031	Movement	South Africa to SE Atlantic	–	–	–	–	3,846.0	24.7	155.7	6.5

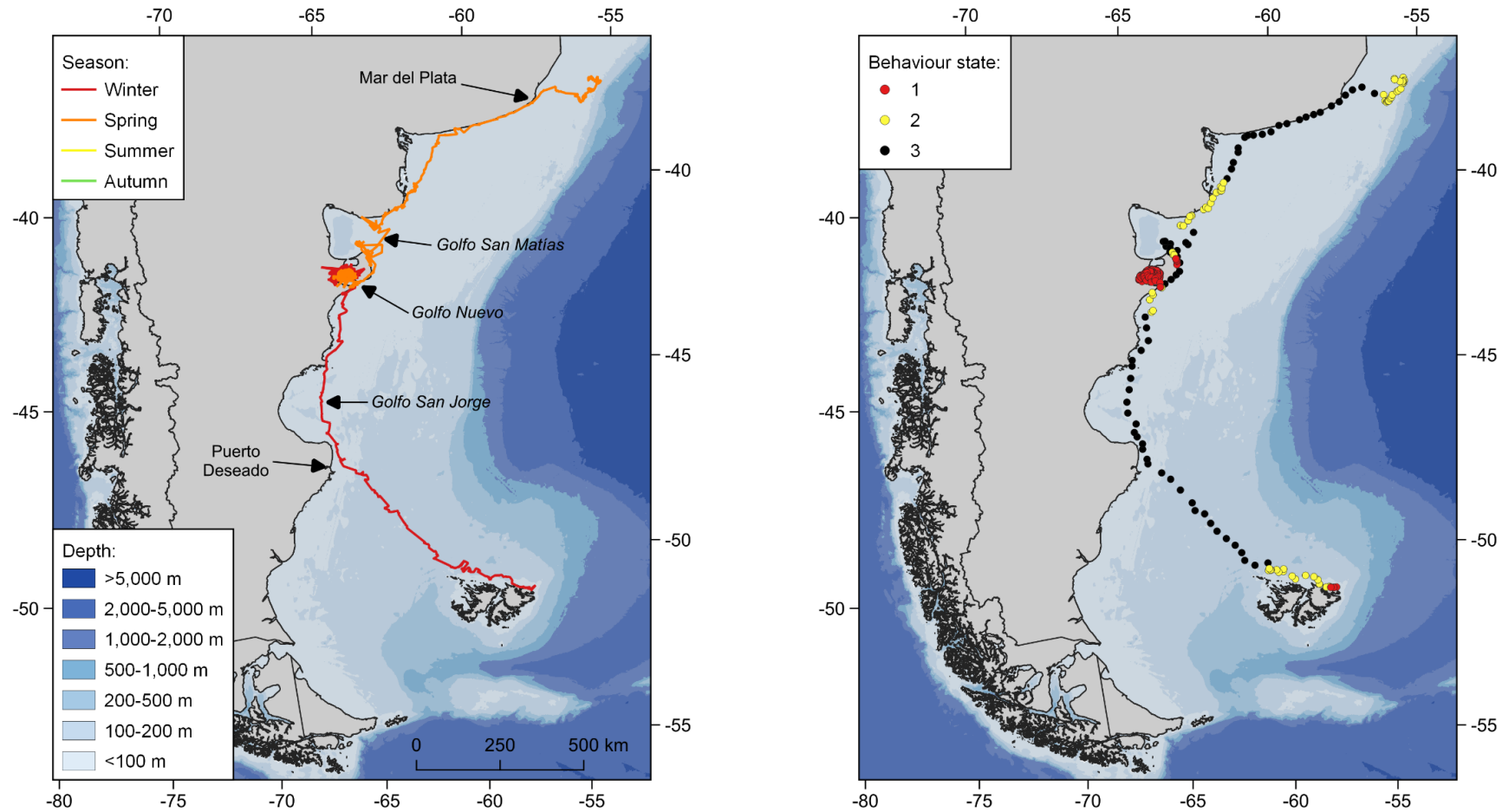
### Literature Cited in Tables S1 and S2.

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- Mackay AI, Bailleul F, Carroll EL, Andrews-Goff V and others (2020) Satellite derived offshore migratory movements of southern right whales (*Eubalaena australis*) from Australian and New Zealand wintering grounds. *PLOS ONE* 15:e0231577
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- Zerbini A, Rosenbaum H, Mendez M, Sucunza F and others (2016) Tracking southern right whales through the southwest Atlantic: an update on movements, migratory routes and feeding grounds. *International Whaling Commission Scientific Committee Paper SC/66b/BRG/26*



**Figure S1.** Unfiltered Argos locations from 10 satellite-tracked southern right whales *Eubalaena australis*, categorised by broad habitat type: Nearshore - shelf (<200 m depth) waters located <30 km from the coasts of South America and the Falkland Islands (Malvinas) that comprises winter breeding habitat; Outer shelf - waters <200 m depth, excluding Nearshore; Slope - waters 200–1,999 m depth; and Oceanic - waters  $\geq 2,000$  m depth.

(A) Beatrice



**Figure S2.** Tracks of 10 southern right whales *Eubalaena australis* satellite-tagged in the Falkland Islands (Malvinas) by season (unfiltered dataset, left) and by behavioural state (modelled dataset, right): (A) Beatrice; (B) Sandy; (C) Walter; (D) Kelpie; (E) Elizabeth; (F) Elmo; (G) Dora; (H) Frosty; (I) Byron; and (J) Pebble. BS1: slow and non-directional movement indicative of high-use habitats; BS2: intermediate speed of movement and rate of directional change; and BS3: faster and directed movement, consistent with transitory habitats. Gaps in tag transmission exceeding 24 hr are shown by a dotted line in the unfiltered track maps. Bathymetry labelled in part A also applies to parts B–J. Season was defined as: winter (June to August); spring (September to November); summer (December to February); and autumn (March to May).

(B) Sandy

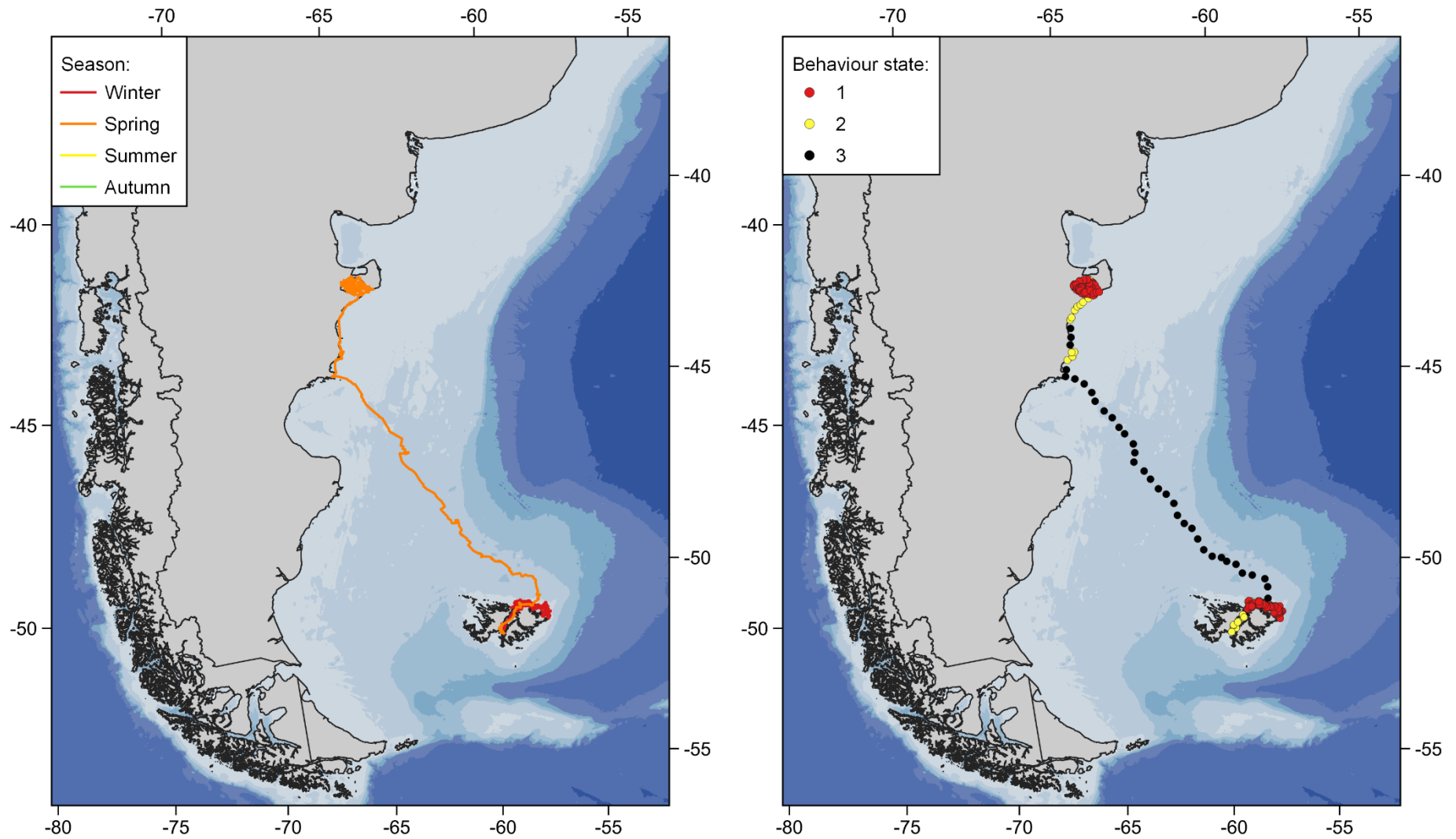


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(C) Walter

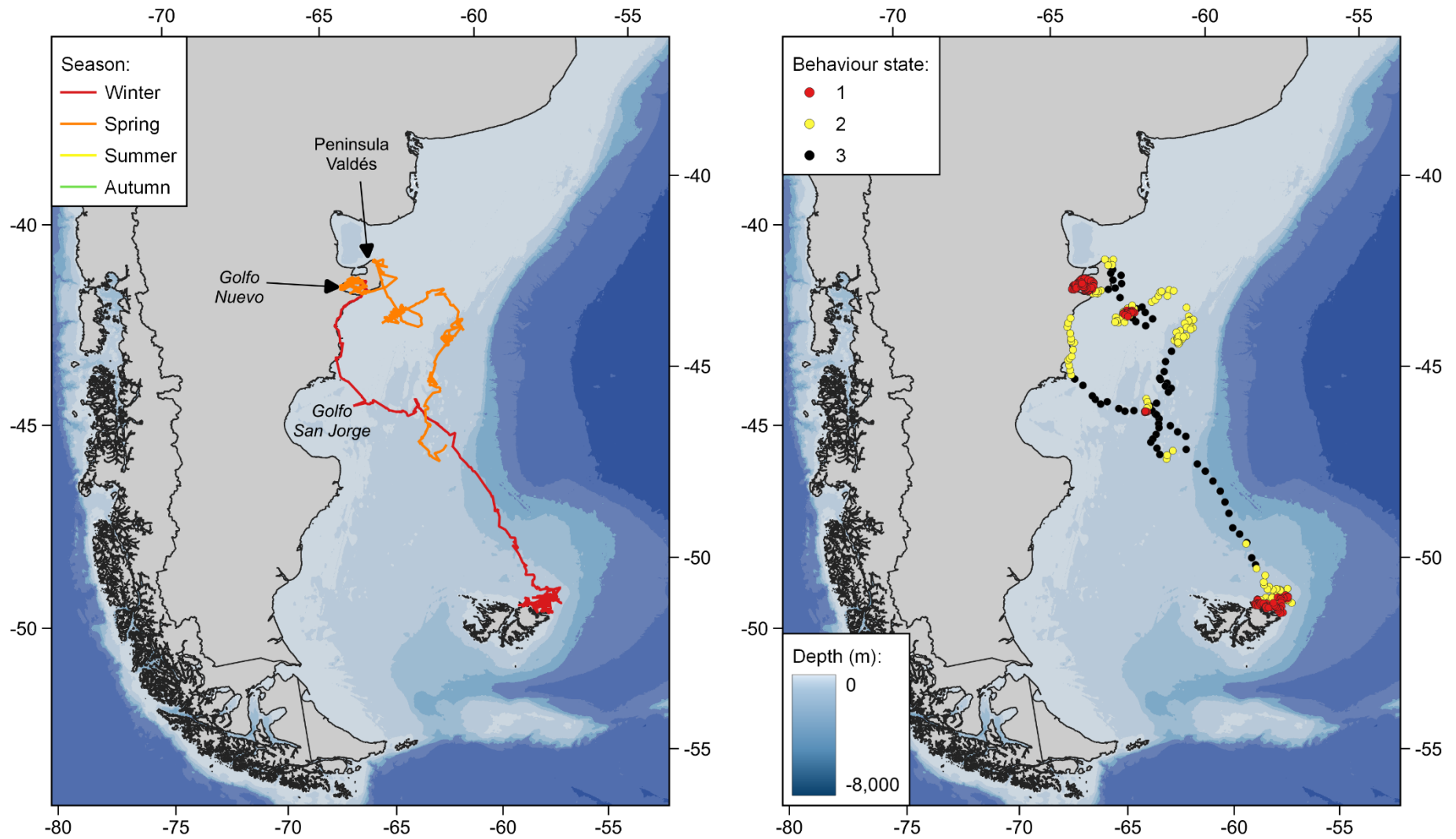


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(D) Kelpie

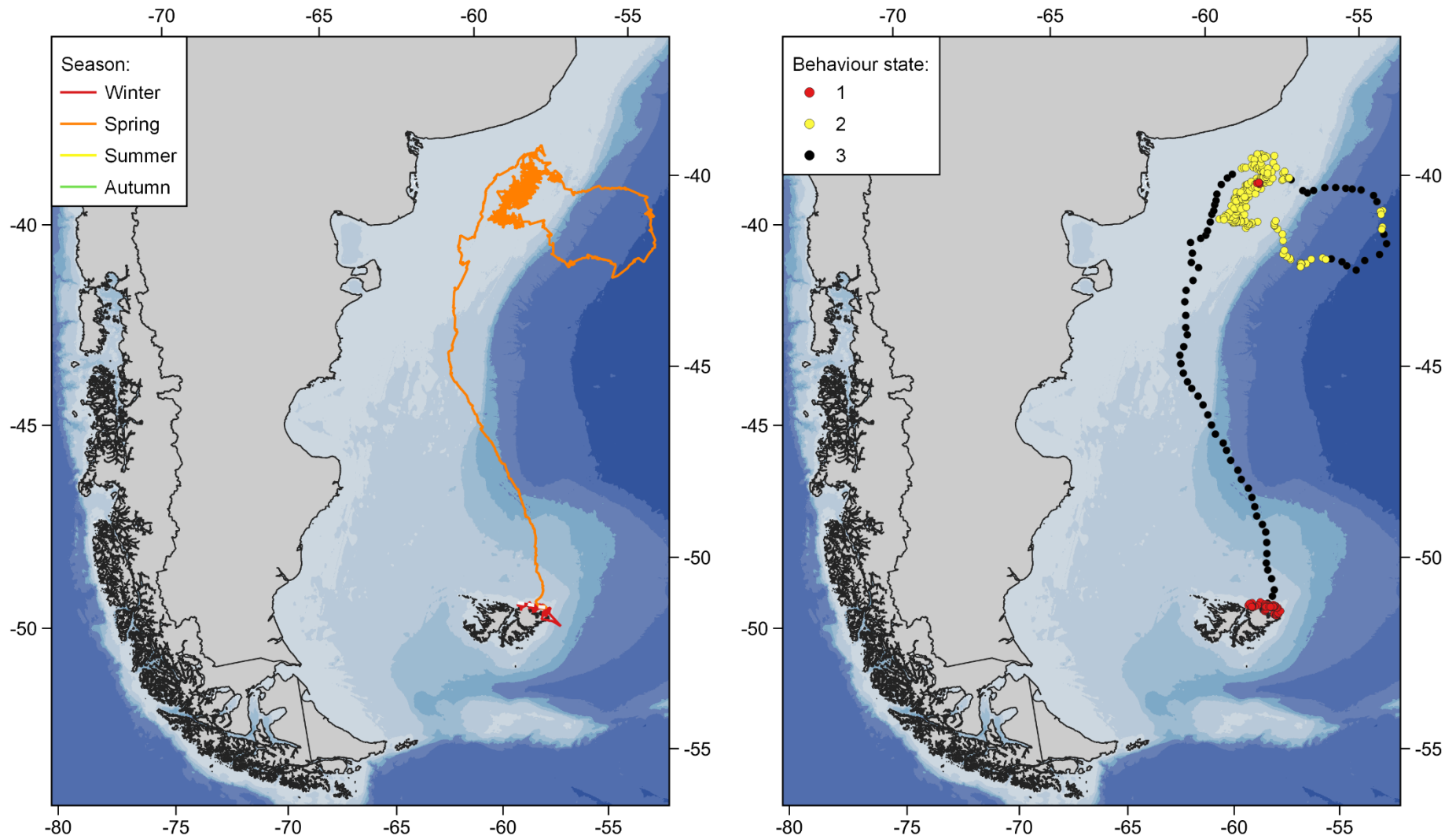


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(E) Elizabeth

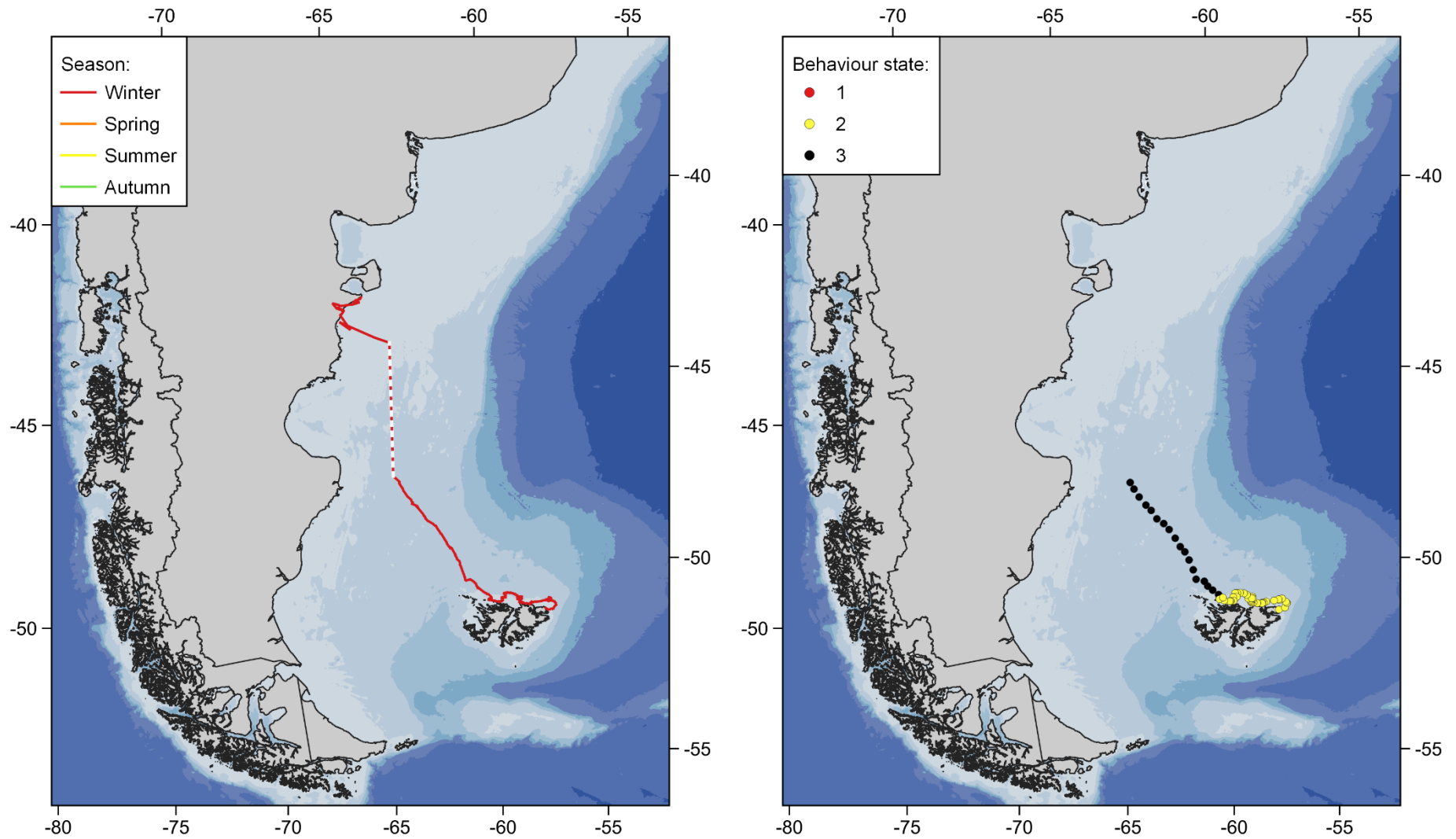


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(F) Elmo

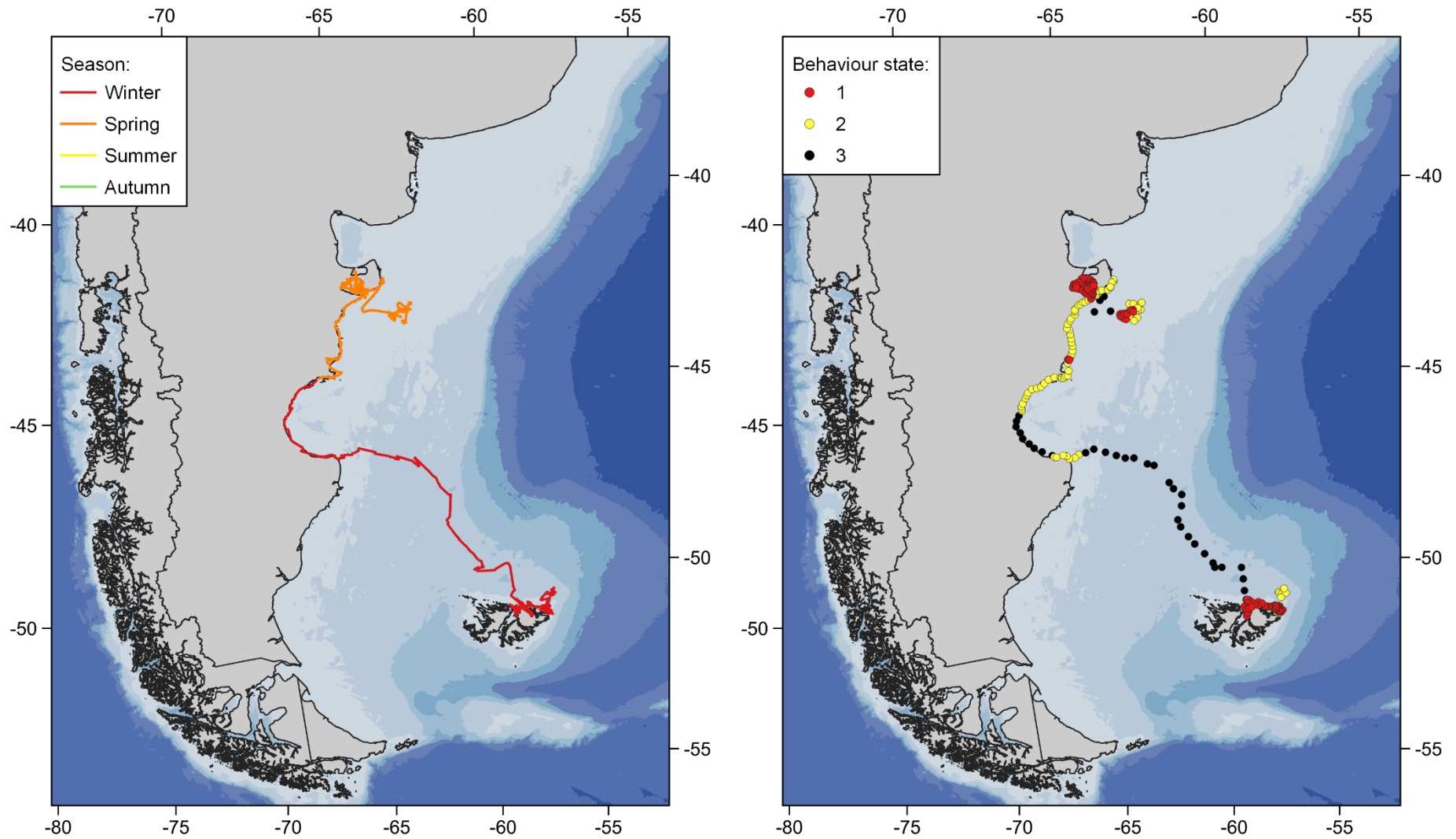


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(G) Dora

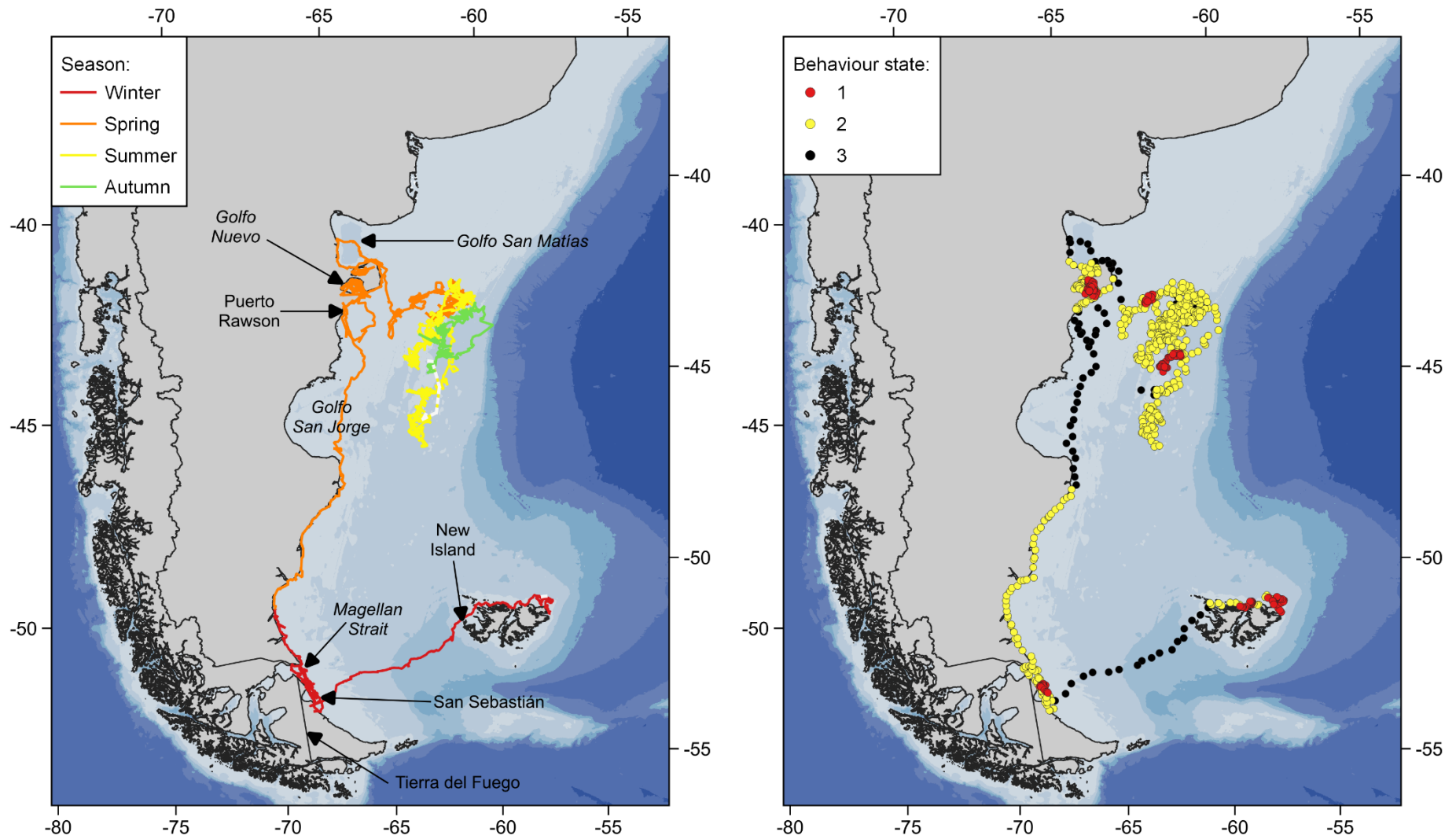


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(H) Frosty

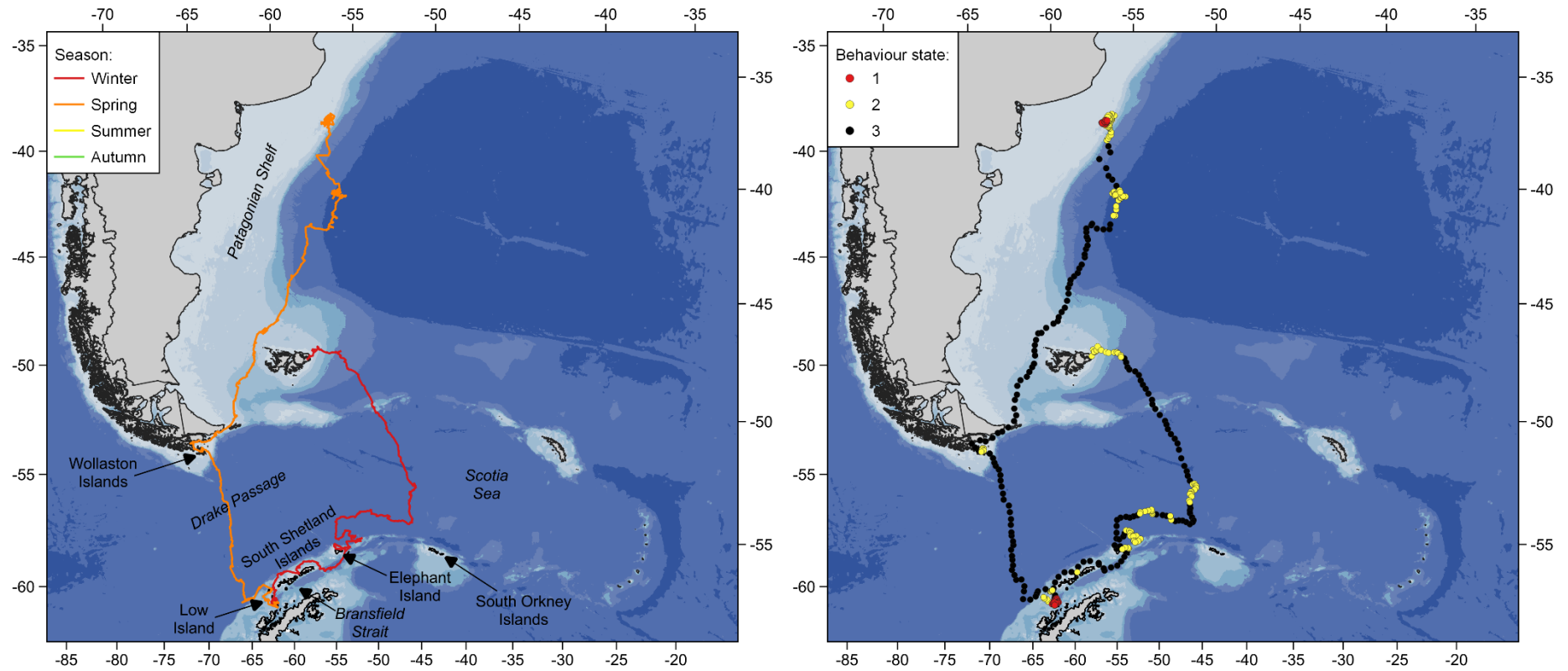


Figure S2. Contd.

(I) Byron

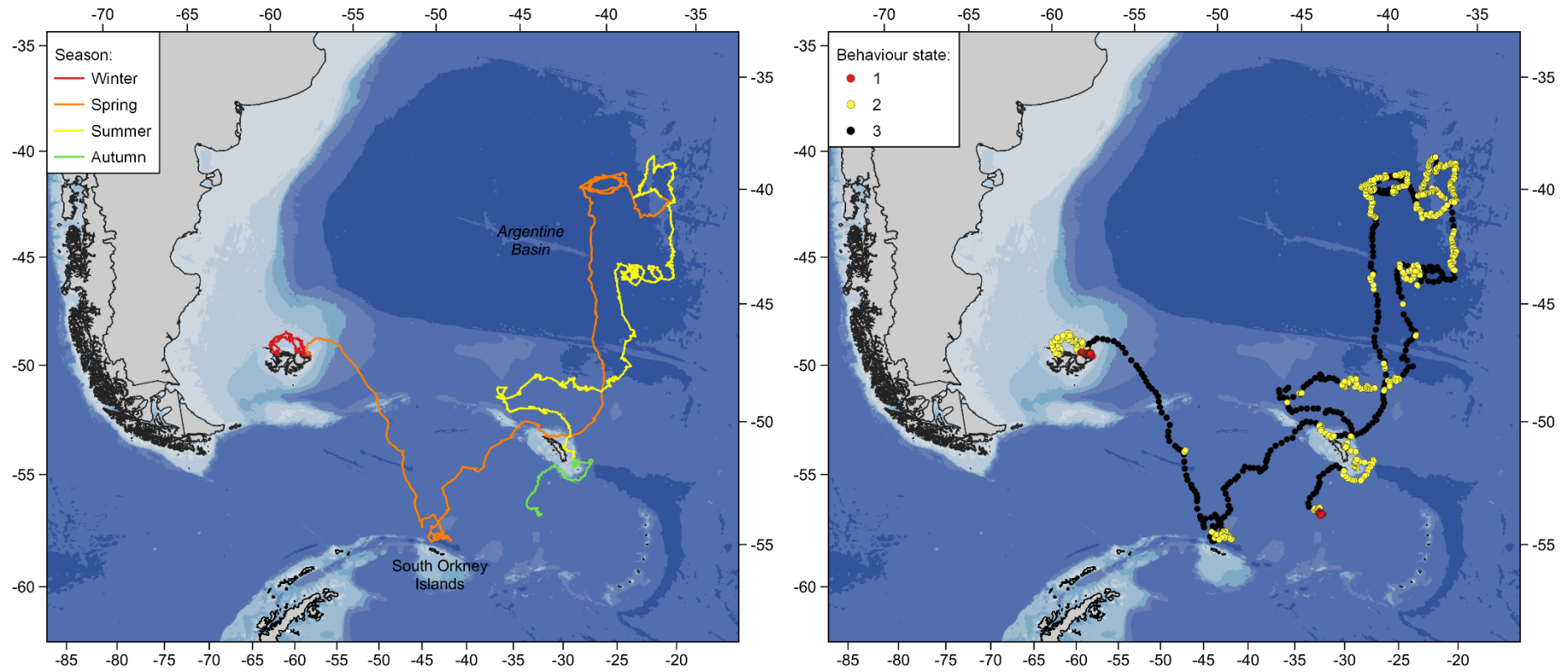


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(J) Pebble

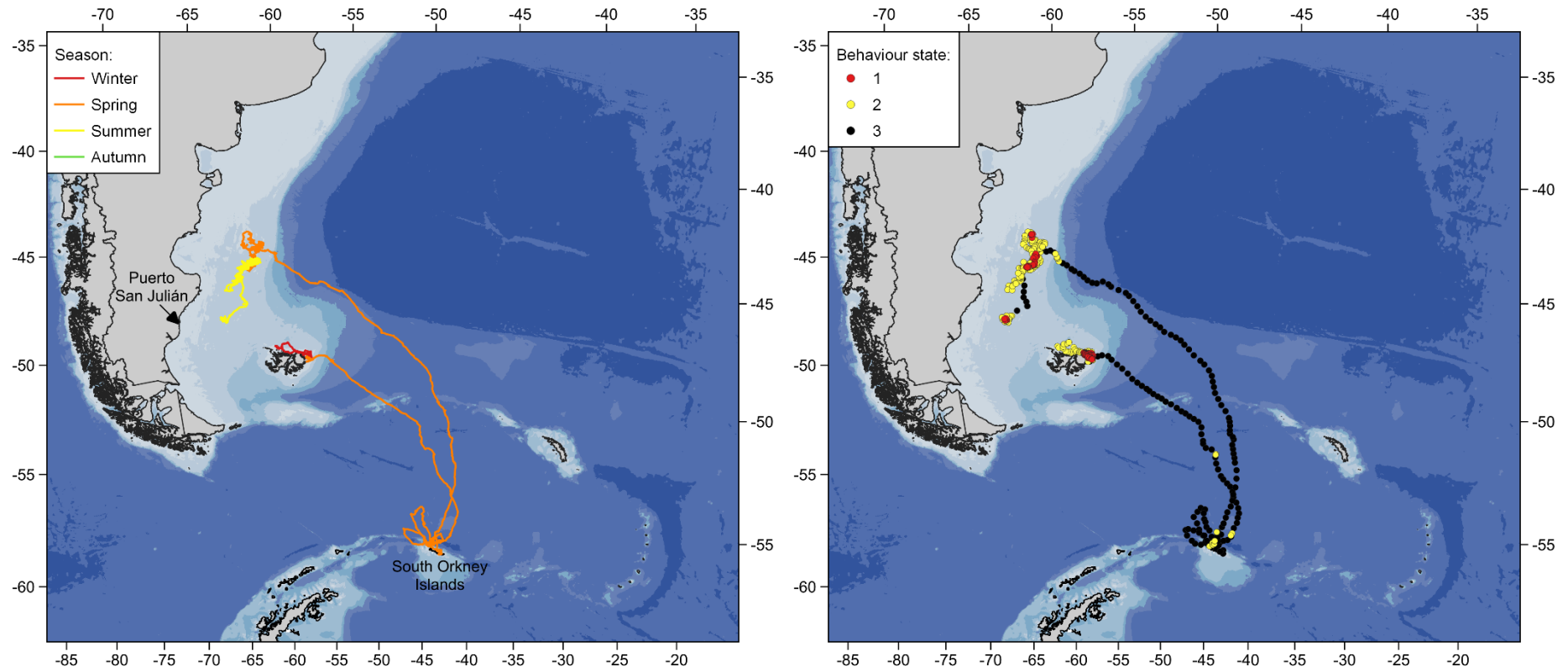
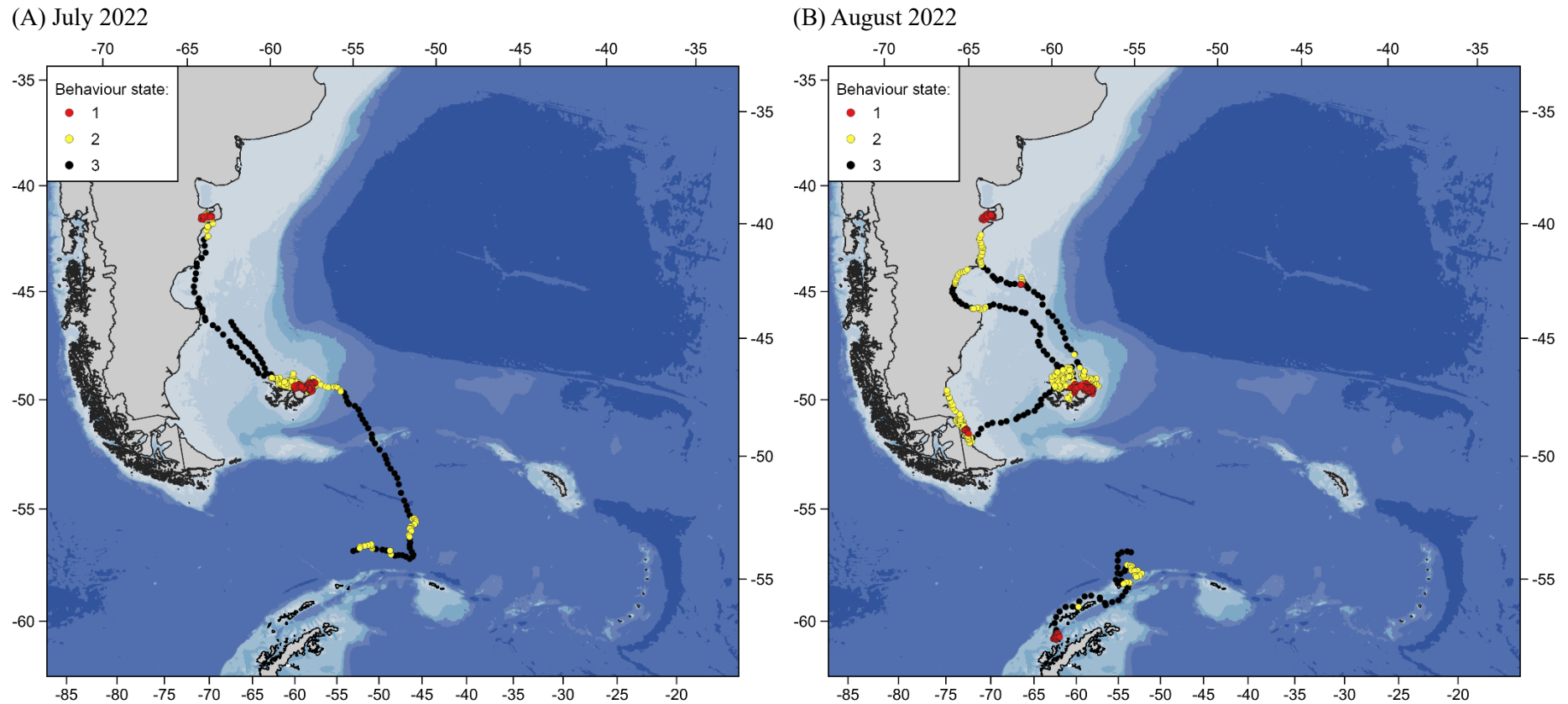
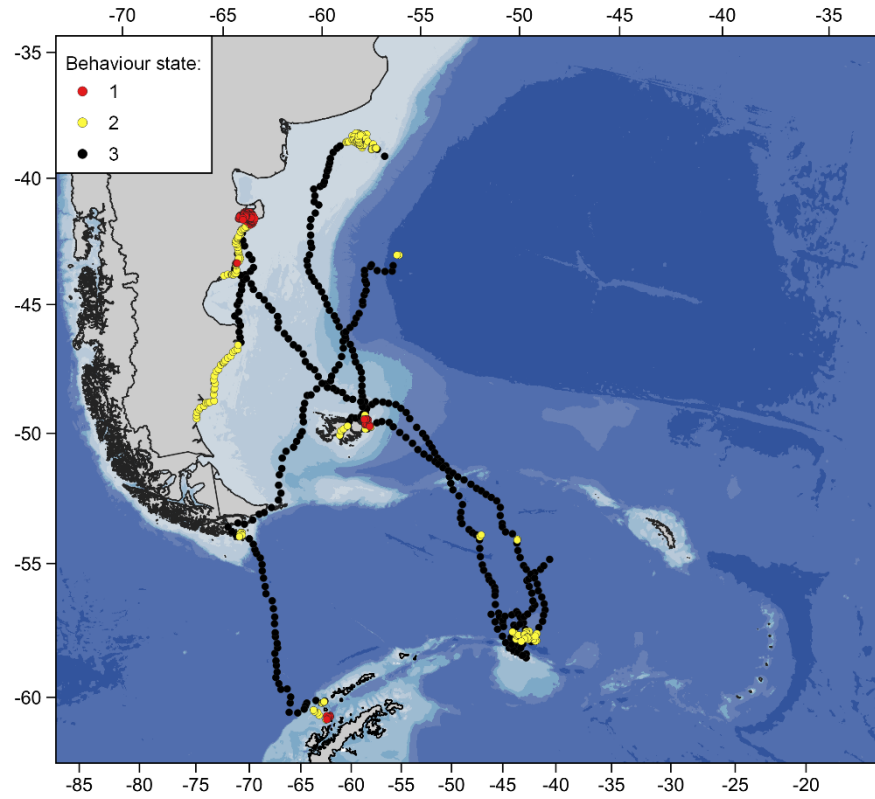


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**Figure S3.** Combined tracks of 10 southern right whales *Eubalaena australis* satellite-tagged in the Falkland Islands (Malvinas) by behavioural state (modelled dataset) in: (A) July 2022; (B) August 2022; (C) September 2022; (D) October 2022; (E) November 2022; (F) December 2022; (G) January 2023; (H) February 2023; (I) March 2023; and (J) April 2023. Bathymetry and place names in Figure S2.

(C) September 2022



(D) October 2022

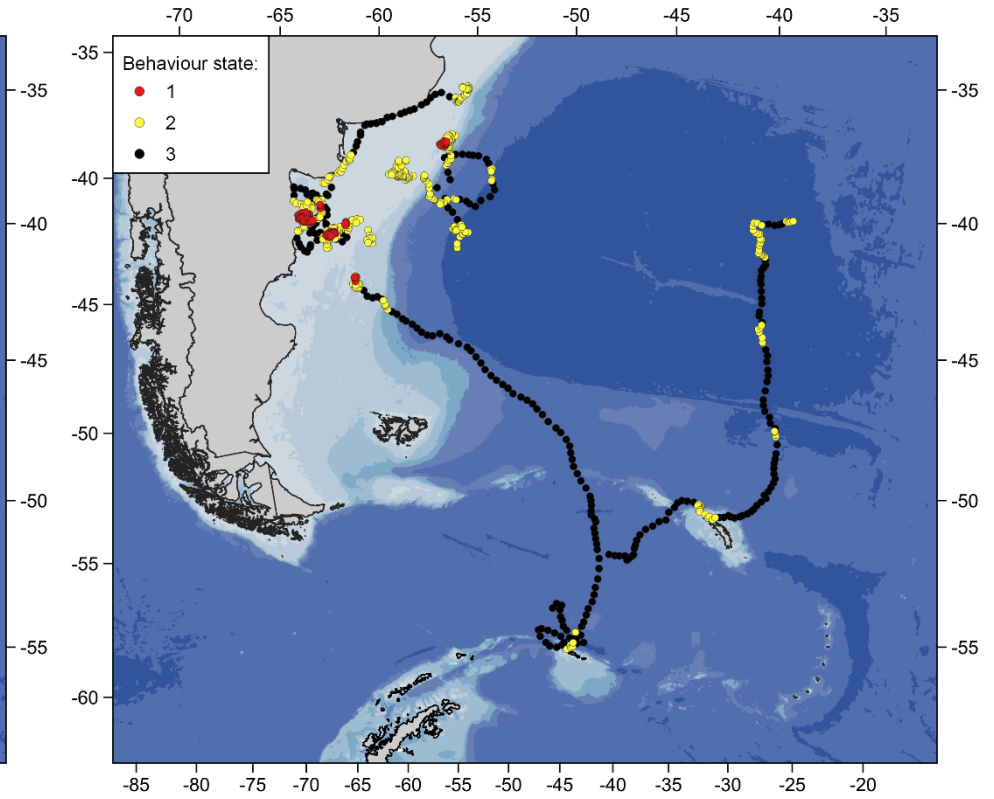
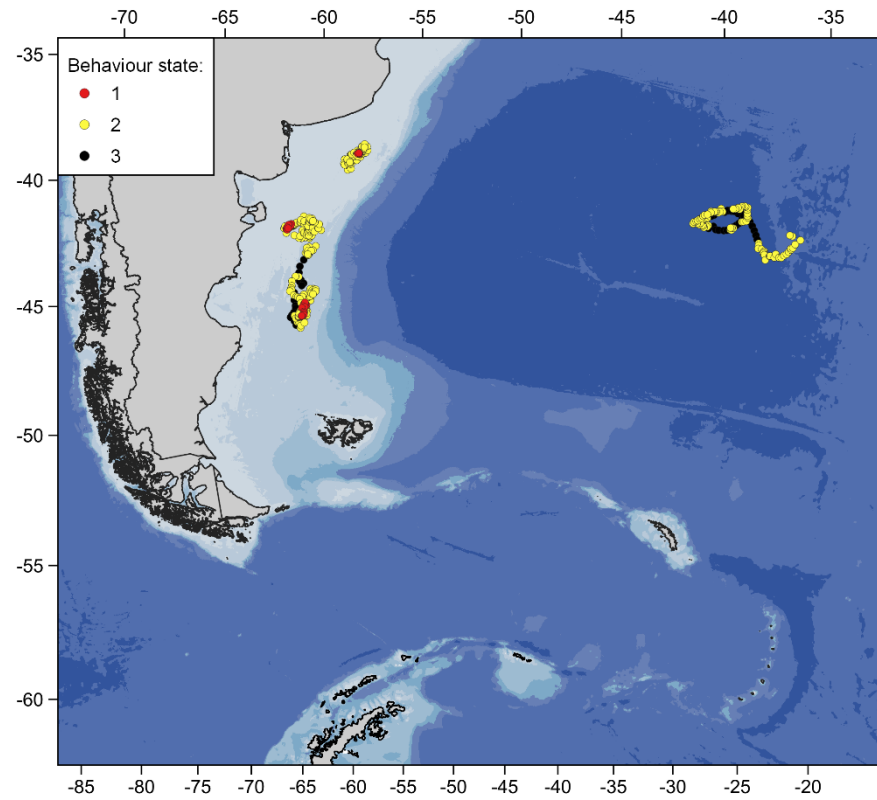


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(E) November 2022



(F) December 2022

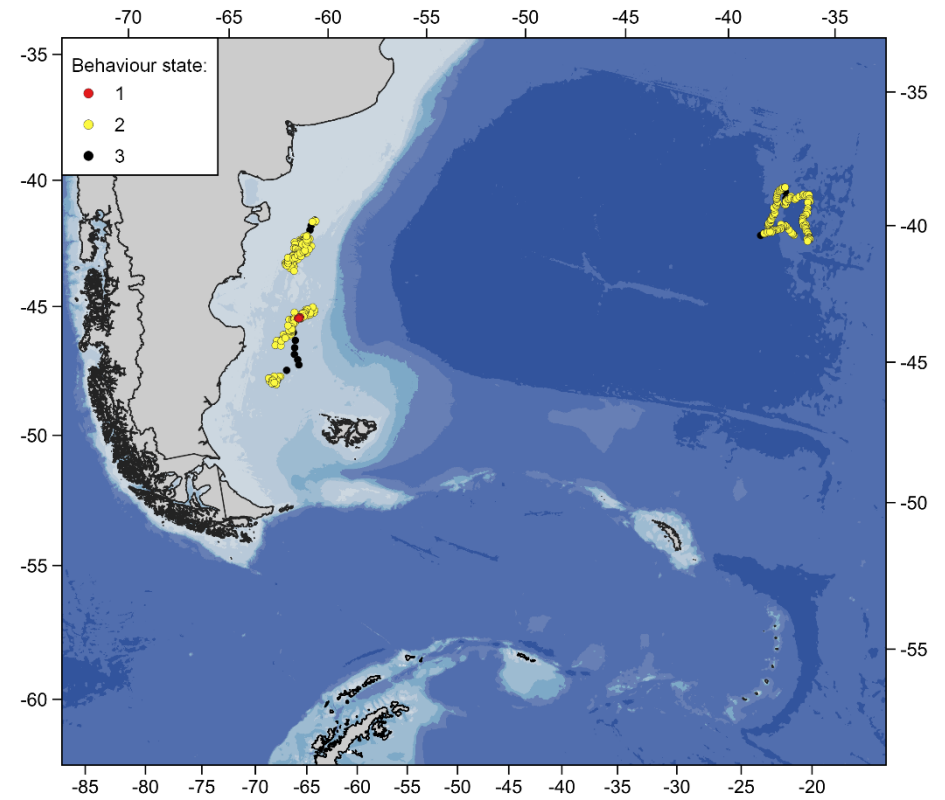
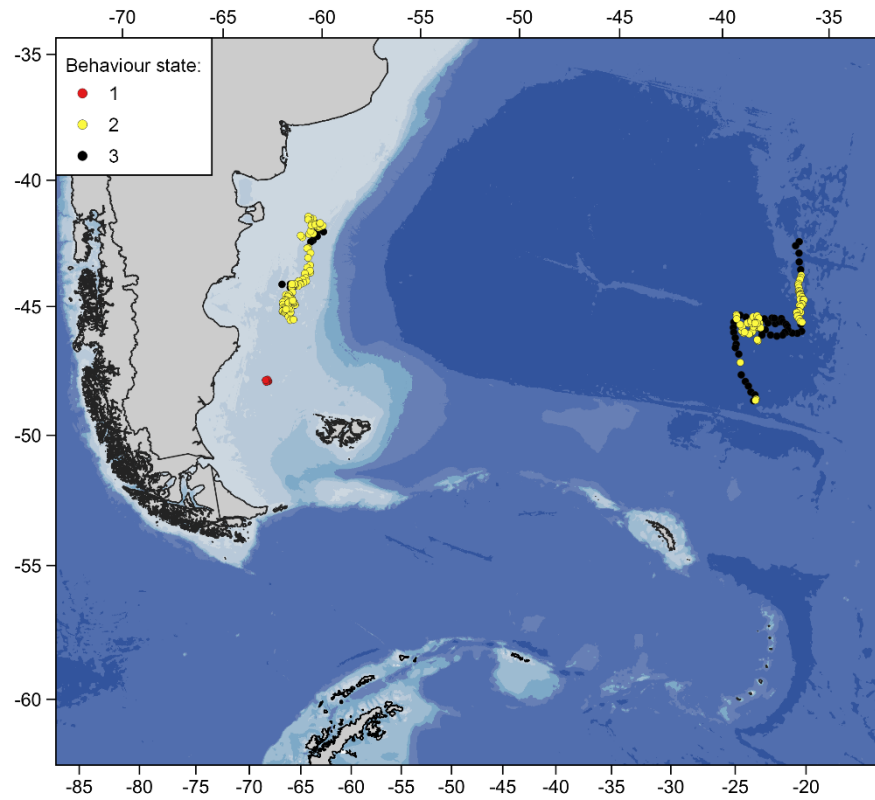


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(G) January 2023



(H) February 2023

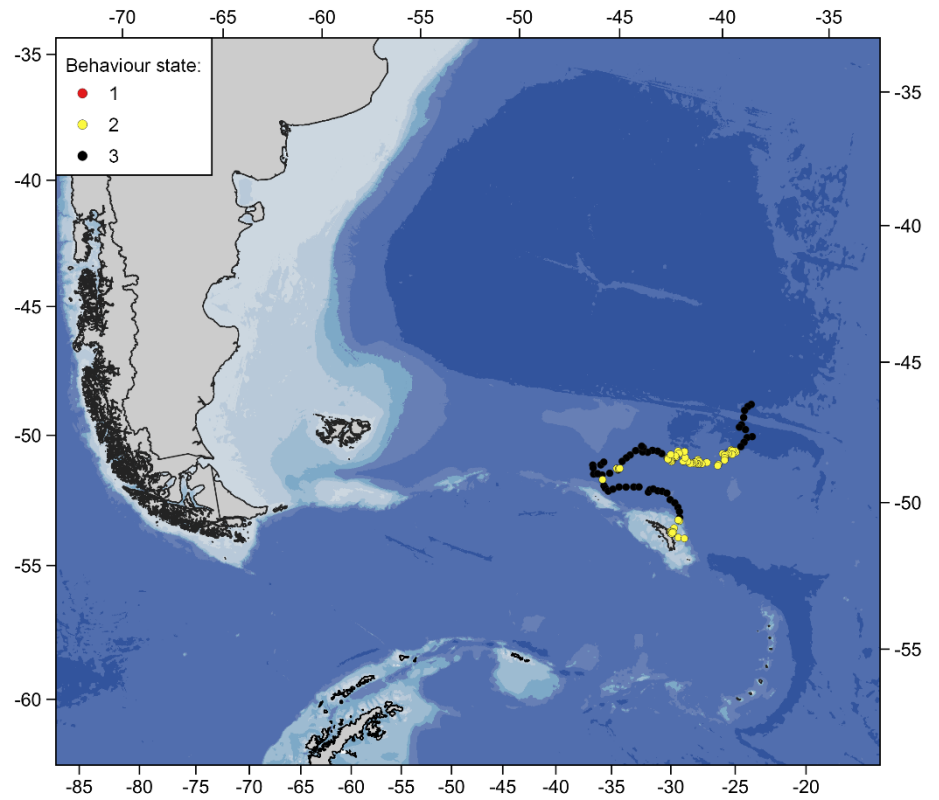
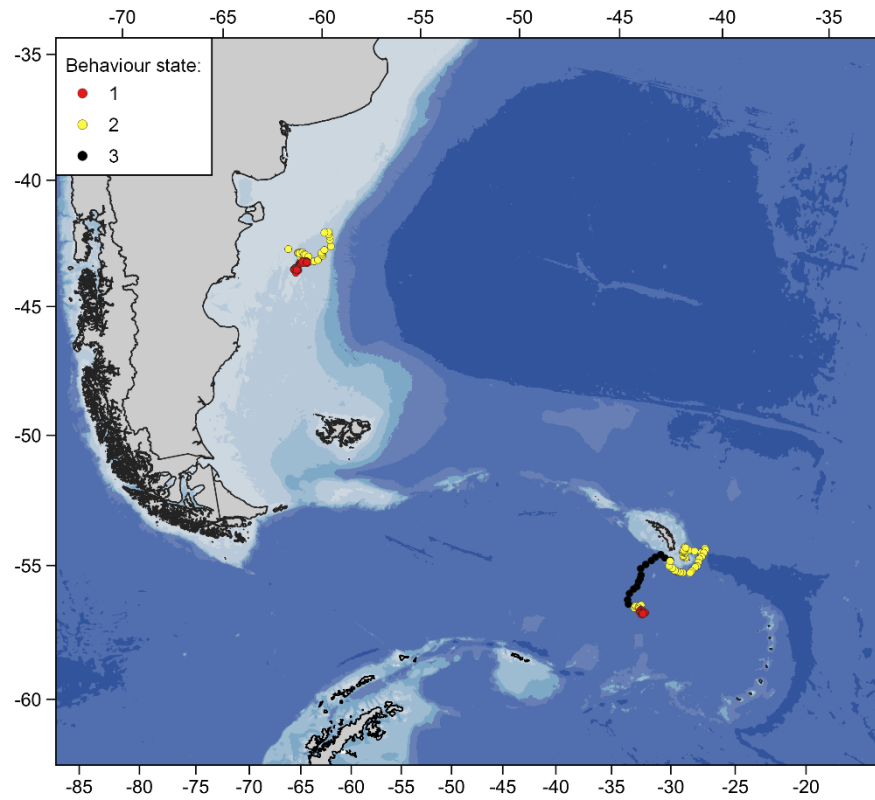


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(I) March 2023



(J) April 2023

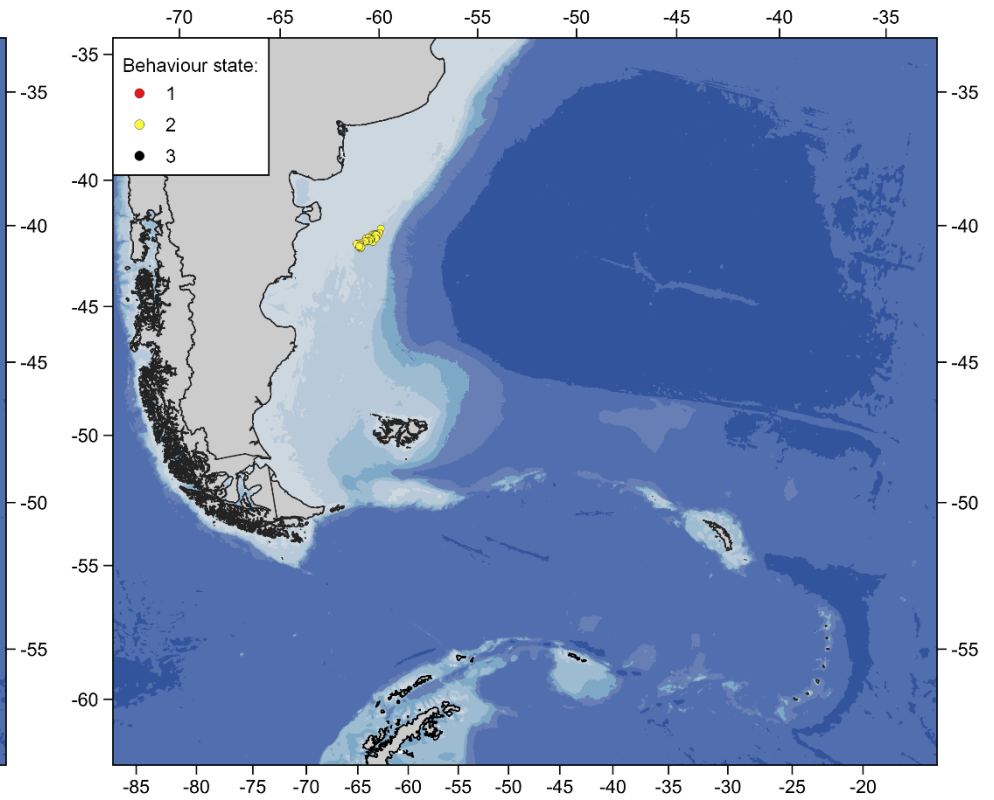
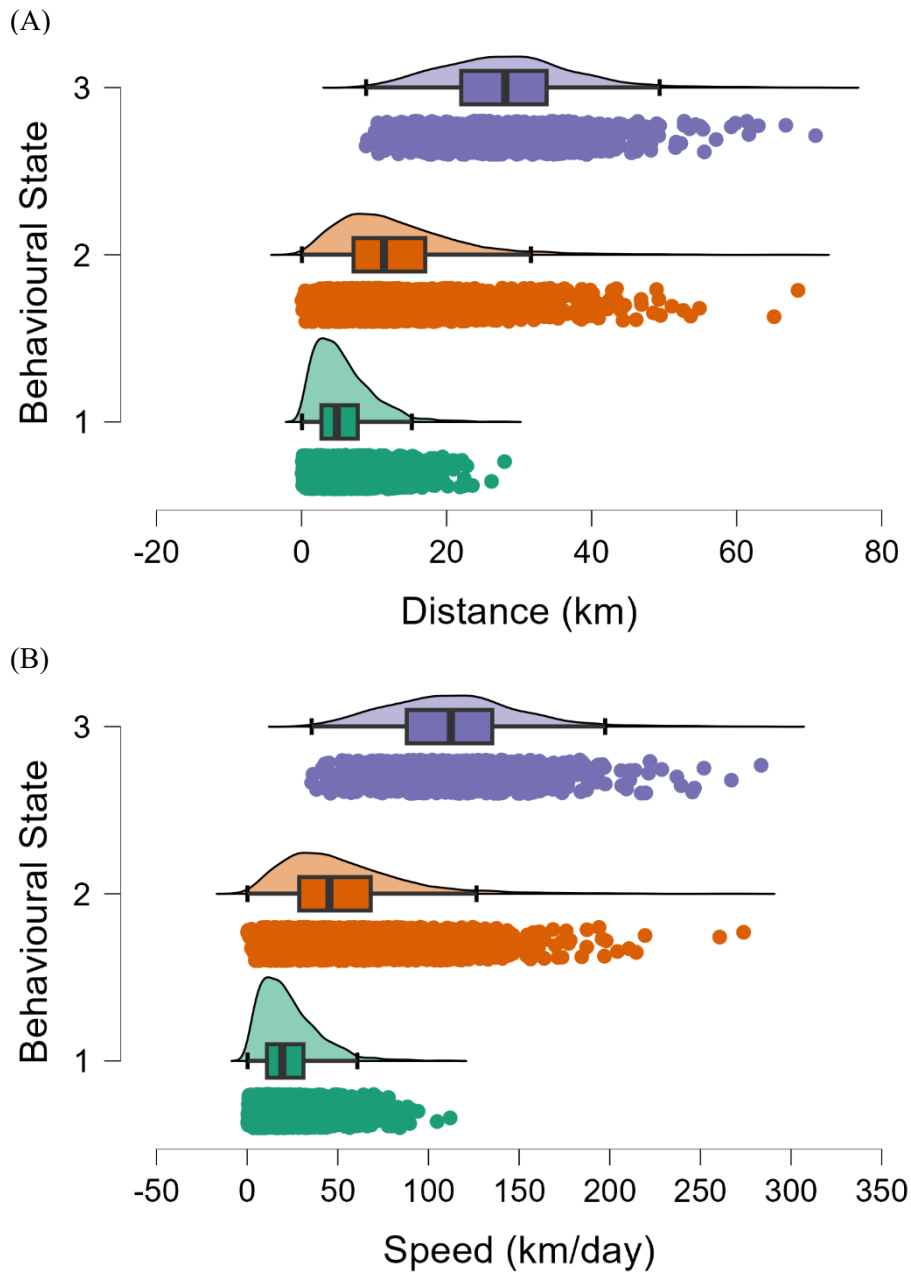


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**Figure S4.** Statistically significant differences (Kruskal-Wallis test,  $H = 2,839.9$ ,  $df = 2$ ,  $p < 0.001$ ) were apparent between the three Behavioural States (BS) of tagged southern right whales *Eubalaena australis* in: (A) the mean distance travelled between modelled locations; and (B) the average swim speeds between modelled locations. All pairwise comparisons were highly significant ( $p < 0.001$ ). Whales swam greater distances between locations and consequently at higher speeds as they progressed from BS1 (slow and non-directional movement indicative of high-use habitats) to BS2 (intermediate speed of movement and rate of directional change) to BS3 (faster and directed movement, consistent with transitory habitats).