

Olive ridley inter-nesting and post-nesting movements along the Brazilian coast and Atlantic Ocean

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Table S1. Olive ridley PTT deployment, biometry, duration of the transmission, and post-nesting migration strategy. CCL: curved carapace length, CCW: curved carapace width, Ocean: oceanic directional movement migratory strategy, S/SE: south/southeastern directional movement migratory strategy, N/NE: north/northeastern directional movement migratory strategy.

PTT	Model	CCL (Cm)	CCW (Cm)	Clutch	Longitude	Latitude	Last signal	SSM last location	SSM duration (days)	Migration Strategy
135245	SPOT	67.5	67.5	14/01/2014	-36.82362	-10.71621	23/04/2014	23/04/2014	99	Ocean
135246	SPOT	64	67	18/01/2014	-36.83815	-10.72899	01/04/2014	01/04/2014	73	Ocean
135248	SPOT	75	73	19/01/2014	-36.83728	-10.72822	05/03/2014	05/03/2014	45	S/SE
135250	SPOT	76.5	75	27/01/2014	-36.82679	-10.71932	19/10/2014	19/10/2014	265	S/SE
135251	SPOT	72.5	69	21/04/2014	-36.81997	-10.71361	16/11/2014	16/11/2014	209	Ocean
135265	SPLASH	67.5	67	09/02/2014	-36.83121	-10.72301	05/05/2014	05/05/2014	85	N/NE
135267	SPLASH	71	70	06/03/2014	-36.83344	-10.72482	02/10/2014	02/10/2014	210	Ocean
135252	SPOT	74	71.5	03/06/2014	-36.60442	-10.58119	24/08/2014	24/08/2014	82	N/NE
135253	SPOT	68.5	66	03/06/2014	-36.83384	-10.72567	27/09/2014	27/09/2014	116	N/NE
135254	SPOT	73	74	22/06/2014	-36.79405	-10.69351	25/10/2014	25/10/2014	125	Ocean
135255	SPOT	69	71	03/07/2014	-36.69499	-10.64026	05/10/2014	05/10/2014	94	Ocean
135256	SPOT	71	70.5	20/09/2014	-36.84644	-10.73664	06/05/2015	06/05/2015	228	Ocean
135257	SPOT	69	71	22/09/2014	-36.66269	-10.62291	23/05/2015	23/05/2015	243	Ocean
135268	SPLASH	68	68	02/06/2014	-36.74152	-10.66028	08/09/2014	08/09/2014	98	Ocean
135269	SPLASH	71	70.5	25/07/2014	-36.84407	-10.73455	05/12/2014	05/12/2014	133	Ocean
135270	SPLASH	70	73	16/09/2014	-36.71706	-10.64845	04/11/2014	04/11/2014	49	Ocean
135271	SPLASH	69.5	67.5	19/09/2014	-36.60732	-10.58285	03/10/2014	03/10/2014	14	-
135259	SPOT	76.5	73	09/11/2014	-36.8436	-10.73397	20/04/2015	20/04/2015	162	S/SE
135260	SPOT	75	72	05/12/2014	-36.77677	-10.68139	17/11/2015	15/10/2015	314	S/SE
135261	SPOT	75	75	23/12/2014	-36.79214	-10.69209	23/10/2015	15/10/2015	296	S/SE
135262	SPOT	68	69	06/01/2015	-36.79904	-10.69714	22/06/2015	22/06/2015	167	Ocean
135263	SPOT	67	69	12/01/2015	-36.82564	-10.71848	10/06/2015	10/06/2015	149	Ocean
135264	SPOT	73.5	74	17/01/2015	-36.84058	-10.73146	24/03/2016	15/10/2015	271	S/SE
135272	SPLASH	77.5	75	05/11/2014	-36.84633	-10.73678	01/06/2015	01/06/2015	208	S/SE
135273	SPLASH	79	77	05/12/2014	-36.82145	-10.71487	30/06/2015	30/06/2015	207	S/SE
135274	SPLASH	66.5	66	17/01/2015	-36.84493	-10.7354	02/04/2015	02/04/2015	75	Ocean
140726	SPLASH	71	71	05/08/2014	-36.83147	-10.72313	17/11/2014	17/11/2014	104	Ocean
140727	SPLASH	70	70	05/08/2014	-36.77763	-10.68286	24/04/2015	24/04/2015	262	Ocean
140728	SPLASH	65	66.5	06/08/2014	-36.78730	-10.68885	02/02/2015	02/02/2015	180	Ocean
140729	SPLASH	68	71	30/08/2014	-36.61907	-10.59103	26/10/2014	26/10/2014	57	N/NE
140730	SPLASH	72.5	75.5	30/08/2014	-36.75751	-10.67027	24/11/2014	24/11/2014	86	Ocean
140731	SPLASH	67.5	67.5	01/09/2014	-36.84412	-10.73251	08/02/2015	08/02/2015	160	Ocean
140732	SPLASH	77.5	77	22/09/2014	-36.76234	-10.67312	26/08/2015	26/08/2015	338	S/SE
140733	SPLASH	70	70	28/09/2014	-36.75172	-10.66664	21/12/2014	21/12/2014	84	S/SE
140734	SPLASH	73	71	10/12/2014	-36.845	-10.735	03/04/2015	03/04/2015	114	S/SE
140735	SPLASH	76.5	74	11/12/2014	-36.84529	-10.73581	31/03/2015	31/03/2015	110	S/SE
140736	SPLASH	75	72	29/12/2014	-36.80107	-10.6987	02/06/2015	02/06/2015	155	S/SE
140737	SPLASH	76	76.5	05/01/2015	-36.81963	-10.71327	25/07/2015	25/07/2015	201	S/SE
140738	SPLASH	75.5	75	06/01/2015	-36.81693	-10.71329	13/10/2015	13/10/2015	280	S/SE
140739	SPLASH	68	68	14/01/2015	-36.847	-10.7373	19/06/2015	19/06/2015	156	S/SE

Table S2. Olive ridley inter-nesting residence time, inferred inter-nesting interval, and kernel density estimation core (KDE 50%) and home range (KDE 90%) area (km²). Ocean: oceanic directional movement migratory strategy, S/SE: south/southeastern directional movement migratory strategy, N/NE: north/northeastern directional movement migratory strategy, *: Haul-out event registered.

PTT	Inter-nest Start	Inter-nest End	Inter-nesting Residence time (days)	Inter-nesting SSM	Inferred Inter-nesting interval (days)	KDE 50% (Km ²)	KDE 90% (Km ²)	Migration Strategy
135245	14/01/2014	3/02/2014	20	yes	18	113.35	380.04	Ocean
135246	18/01/2014	22/01/2014	4	no	-	-	-	Ocean
135248	19/01/2014	5/02/2014	17	yes	14	3092.78	8814.29	S/SE
135250	27/01/2014	25/02/2014	29	yes	19; 11	908.85	3085.83	S/SE
135251	21/04/2014	28/04/2014	7	yes		1100.22	3153.64	Ocean
135252	3/06/2014	24/06/2014	21	yes	18	922.5	2880.22	N/NE
135253	3/06/2014	7/06/2014	4	no	-	-	-	N/NE
135254	22/06/2014	15/07/2014	23	yes	23	64.88	262.28	Ocean
135255	3/07/2014	27/07/2014	24	yes	20	222.09	687.96	Ocean
135256	20/09/2014	5/10/2014	15	yes	14	588.76	1670.49	Ocean
135257	22/09/2014	25/09/2014	3	no	-	-	-	Ocean
135259	9/11/2014	28/11/2014	19	yes	21	1114.23	3587.9	S/SE
135260	5/12/2014	8/01/2015	34	yes	18; 13	104.22	340.37	S/SE
135261	23/12/2014	14/01/2015	22	yes	19	2159.8	6964.3	S/SE
135262	6/01/2015	22/01/2015	16	yes	11	721.55	2635.13	Ocean
135263	12/01/2015	12/02/2015	31	yes	23	685.66	3826.51	Ocean
135264	17/01/2015	7/02/2015	21	yes	22	1887.79	6928.5	S/SE
135265	9/02/2014	12/02/2014	3	no	-	-	-	Ocean
135267	6/03/2014	15/03/2014	9	yes		123.07	389.71	N/NE
135268	2/06/2014	10/06/2014	8	yes		1997.87	5603.13	Ocean
135269	25/07/2014	16/08/2014	22	yes	17	1640.52	4799.52	Ocean
135270	16/09/2014	1/10/2014	15	yes		2772.97	8031.85	Ocean
135272	5/11/2014	10/11/2014	5	no	-	-	-	S/SE
135273	5/12/2014	15/12/2014	10	yes		279.66	841.87	S/SE
135274	17/01/2015	21/01/2015	4	no	-	-	-	Ocean
140726	5/08/2014	23/08/2014	18	yes	20	532.72	1599.71	Ocean
140727	5/08/2014	27/08/2014	22	yes		1093.67	3297.33	Ocean
140728	6/08/2014	3/09/2014	28	yes	22; 10	644.7	2664.4	Ocean
140729	30/08/2014	26/09/2014	27	yes	23	1319.77	4505.45	N/NE
140730*	30/08/2014	25/09/2014	26	yes	22	271.1	955.48	Ocean
140731	1/09/2014	5/10/2014	34	yes		1029.12	3398.43	Ocean
140732	22/09/2014	10/10/2014	18	yes		763.1	2498.99	S/SE
140733	28/09/2014	2/10/2014	4	no	-	-	-	S/SE
140734	10/12/2014	14/12/2014	4	no	-	-	-	S/SE
140735*	11/12/2014	2/01/2015	22	yes	22	63.13	229.13	S/SE
140736	29/12/2014	6/01/2015	8	yes		1335.66	4020.09	S/SE
140737	5/01/2015	8/01/2015	3	no	-	-	-	S/SE
140738	6/01/2015	6/02/2015	31	yes	21; 9	173.04	523.15	S/SE
140739	14/01/2015	18/01/2015	4	no	-	-	-	S/SE

Table S3. Olive ridley post-nesting directional movement distance traveled and duration. Ocean: oceanic directional movement migratory strategy, S/SE: south/southeastern directional movement migratory strategy, N/NE: north/northeastern directional movement migratory strategy.

PTT	Start	End	<u>Directional movement duration (d)</u>	<u>Travelled distance (km)</u>	<u>Area of restricted movement (Inferred Foraging) reached?</u>	<u>Migration strategy</u>
135245	3/02/2014	22/04/2014	78	3621.14	no	Ocean
135246	22/01/2014	1/04/2014	69	2038.003	no	Ocean
135248	5/02/2014	5/03/2014	28	1064.56	no	S/SE
135250	25/02/2014	14/04/2014	48	2228.903	yes	S/SE
135251	28/04/2014	24/08/2014	118	5191.927	yes	Ocean
135252	24/06/2014	24/08/2014	61	3260.373	no	N/NE
135253	7/06/2014	10/07/2014	33	1338.292	yes	N/NE
135254	15/07/2014	25/10/2014	102	4570.536	no	Ocean
135255	27/07/2014	5/10/2014	70	3852.394	no	Ocean
135256	5/10/2014	24/02/2015	142	6063.079	yes	Ocean
135257	25/09/2014	5/02/2015	133	4823.392	no	Ocean
135259	28/11/2014	15/01/2015	48	2263.374	yes	S/SE
135260	8/01/2015	4/03/2015	55	2271.695	yes	S/SE
135261	14/01/2015	10/03/2015	55	2503.648	yes	S/SE
135262	22/01/2015	27/04/2015	95	2853.252	no	Ocean
135263	12/02/2015	29/05/2015	106	5037.978	yes	Ocean
135264	7/02/2015	23/03/2015	44	2346.749	yes	S/SE
135265	12/02/2014	5/05/2014	82	3180.247	no	Ocean
135267	15/03/2014	5/05/2014	51	2260.248	yes	N/NE
135268	10/06/2014	8/09/2014	90	4277.979	no	Ocean
135269	16/08/2014	16/11/2014	92	3447.275	yes	Ocean
135270	1/10/2014	4/11/2014	34	1539.05	no	Ocean
135272	10/11/2014	3/01/2015	54	2322.279	yes	S/SE
135273	15/12/2014	14/02/2015	61	1856.615	yes	S/SE
135274	21/01/2015	1/04/2015	70	2949.274	no	Ocean
140726	23/08/2014	17/11/2014	86	3358.693	no	Ocean
140727	27/08/2014	12/01/2015	138	4491.236	yes	Ocean
140728	3/09/2014	10/12/2014	98	3889.923	yes	Ocean
140729	26/09/2014	26/10/2014	30	1098.793	no	N/NE
140730	25/09/2014	24/11/2014	60	3122.123	no	Ocean
140731	5/10/2014	19/12/2014	75	3442.206	yes	Ocean
140732	10/10/2014	5/12/2014	56	2388.628	yes	S/SE
140733	2/10/2014	25/11/2014	54	2461.828	yes	S/SE
140734	14/12/2014	8/02/2015	56	2333.993	yes	S/SE
140735	2/01/2015	27/02/2015	56	2359.998	yes	S/SE
140736	6/01/2015	14/02/2015	39	2606.657	yes	S/SE
140737	8/01/2015	13/02/2015	36	1507.187	yes	S/SE
140738	6/02/2015	23/03/2015	45	2188.111	yes	S/SE
140739	18/01/2015	5/03/2015	46	2605.57	yes	S/SE

Table S4. Olive ridley area restricted movements (inferred foraging area), kernel density estimation core (KDE 50%) and home range area (KDE 90%), and time spent in the identified area. Ocean: oceanic directional movement migratory strategy, S/SE: south/southeastern directional movement migratory strategy, N/NE: north/northeastern directional movement migratory strategy. Abbreviation of the Brazilian states: BA = Bahia, CE = Ceará, ES = Espírito Santo, MA = Maranhão, PA = Pará, PR = Paraná, SC = Santa Catarina, SP = São Paulo, RJ = Rio de Janeiro.

PTT	<u>Start of restricted movement foraging behavior</u>	<u>End of restricted movement foraging behavior</u>	<u>Time spent in the identified area (d)</u>	KDE 50% (Km ²)	KDE 90% (Km ²)	<u>Migration Strategy</u>	<u>Location of restricted movement foraging area</u>	Remigration Evidence	Second ARM (Forage)
135250	14/04/2014	19/10/2014	188	12678.39	35938.79	S/SE	RJ - SP	no	no
135251	24/08/2014	16/11/2014	84	17302.34	44620.67	Ocean	Guinea Bissau	no	no
135253	10/07/2014	27/09/2014	79	35.21	116.27	N/NE	CE	no	no
135256 a	24/02/2015	9/03/2015	13	252.6	922.42	Ocean	Cape Verde	no	no
135256 b	3/04/2015	11/04/2015	8	1440.21	4260.19	Ocean	Cape Verde	no	yes
135259	15/01/2015	20/04/2015	95	5416.68	17040.97	S/SE	SP	no	no
135260	4/03/2015	11/10/2015	221	4623.11	21655.68	S/SE	RJ - SP	no	no
135261	10/03/2015	15/10/2015	219	4048.75	13697.93	S/SE	SP	no	no
135263	29/05/2015	9/06/2015	11	3898.12	10947.63	Ocean	Liberia	no	no
135264	23/03/2015	13/10/2015	204	7948.83	24882.2	S/SE	SP	no	no
135267	5/05/2014	2/10/2014	150	437.25	1856.5	N/NE	MA - PA	no	no
135269	16/11/2014	5/12/2014	19	1370.96	3774.62	Ocean	Cape Verde	no	no
135272	3/01/2015	26/05/2015	143	1141.06	7778.91	S/SE	SP	yes	no
135273	14/02/2015	30/06/2015	136	6991.66	31603.36	S/SE	SP	no	no
140727	12/01/2015	17/02/2015	36	9701.48	27400.23	Ocean	Senegal	yes	no
140728	10/12/2014	21/01/2015	42	2658.92	8294.58	Ocean	Sierra Leone	no	no
140731	19/12/2014	8/02/2015	51	24794.88	76199.36	Ocean	Guinea Bissau	no	no
140732 a	5/12/2014	25/05/2015	171	2502.94	7322.91	S/SE	SP-PR	yes	no
140732 b	15/07/2015	9/08/2015	25	908.19	2696.51	S/SE	BA	no	yes
140733	25/11/2014	15/12/2014	20	2583.82	7209.13	S/SE	SC	no	no
140734	8/02/2015	1/04/2015	52	5604.13	20909.03	S/SE	SP	no	no
140735	27/02/2015	31/03/2015	32	3442.05	10318.53	S/SE	SP	no	no
140736 a	14/02/2015	17/02/2015	3	10611.49	36302.83	S/SE	SP-SC	no	yes
140736 b	10/03/2015	2/06/2015	84	277.8	900.75	S/SE	RJ	no	no
140737 a	13/02/2015	19/06/2015	126	184.45	744.53	S/SE	RJ	yes	no
140737 b	28/06/2015	25/07/2015	27	14.85	85.99	S/SE	ES	no	yes
140738	23/03/2015	13/10/2015	204	2288.86	11127.58	S/SE	SP	no	no
140739	5/03/2015	18/06/2015	105	2537.28	7668.68	S/SE	SP	no	no

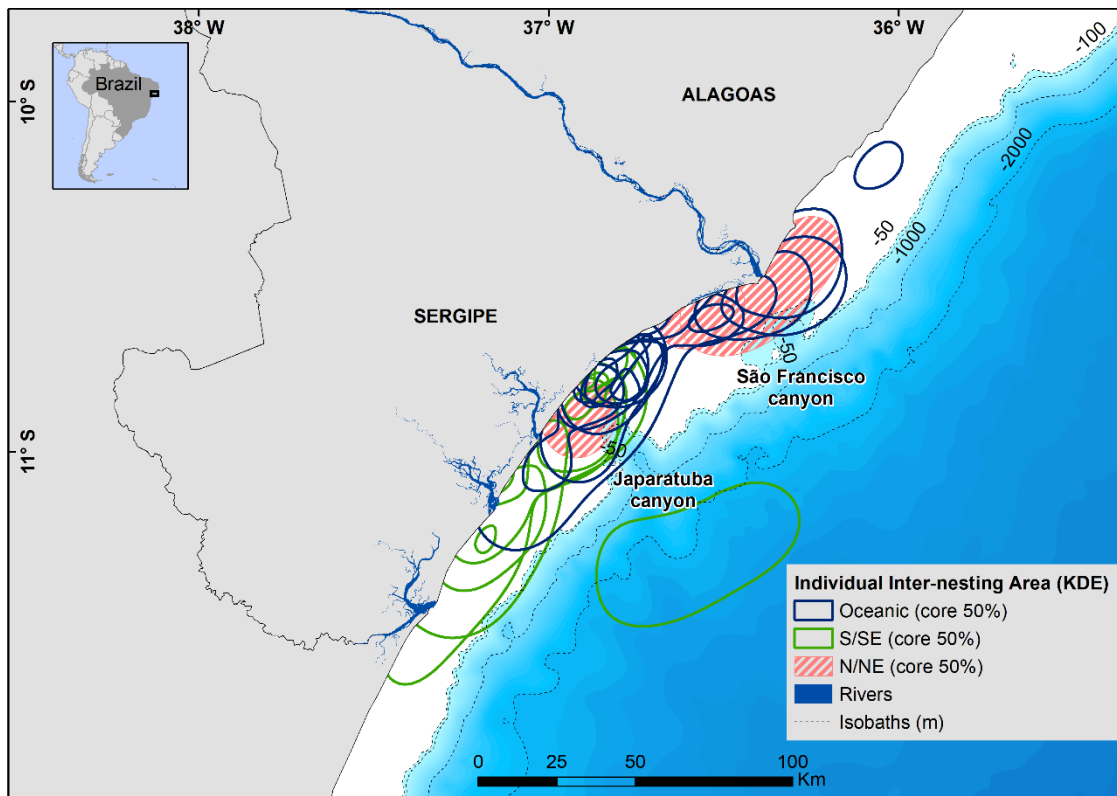


Fig. S1. Olive ridley individual inter-nesting core areas (KDE 50%) displayed by subsequent migratory strategies. The spatial distribution of individual core inter-nesting areas differed based on migration strategy. Olive ridleys that stayed in the center-south portion of the continental shelf migrated to coastal areas in the south of Brazil, while most of the animals that used center-north areas migrated to northern or oceanic areas. Among the 29 individual inter-nesting core areas, only two discontinuous segments exist, one in oceanic waters off Sergipe (PTT 135264) and the other along the South coast of Alagoas (PTT 140731).

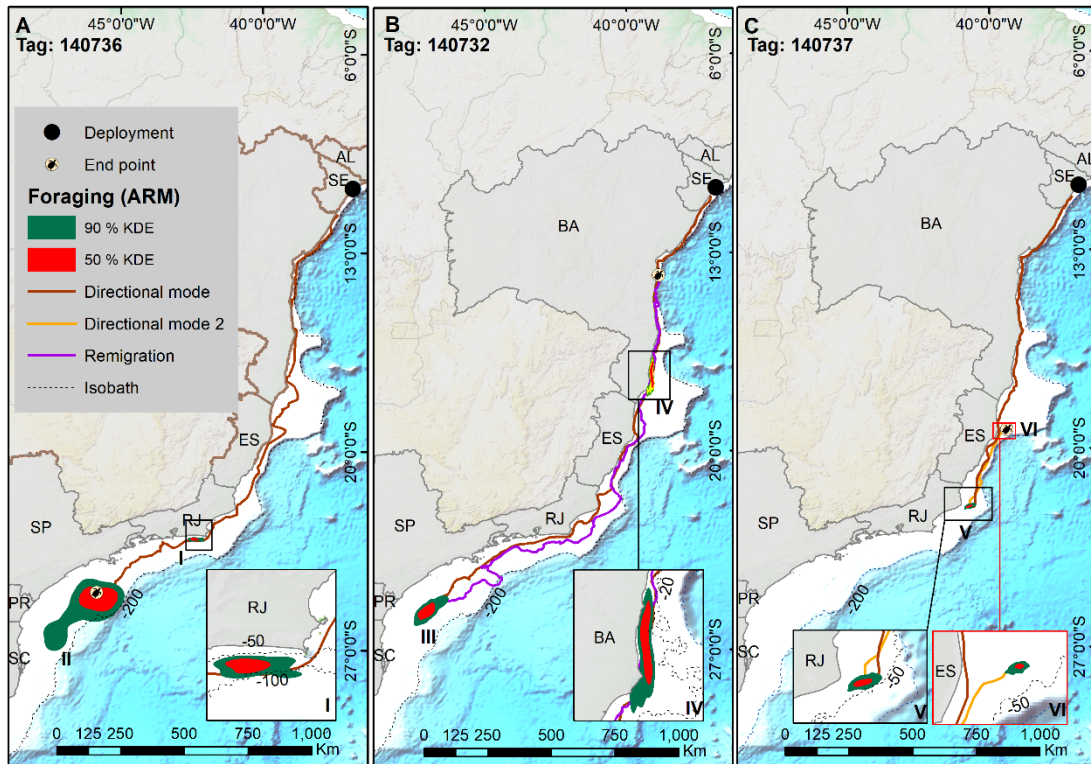


Fig. S2. Olive ridleys with primary and secondary area of restricted movement (ARM) (inferred foraging areas) in the Brazilian southeast continental shelf. A) Tag 140736's main ARM (I) off São Paulo state (SP) and the southernmost movement recorded, off Santa Catarina state (SC) and a small secondary ARM(II) off the coast of Rio de Janeiro (RJ) state. Post-nesting females that showed directional movements to the south were generally characterized by a continuous directional movement without switching behavior. The exception was this one turtle that prior to the end of the directional movement mode, established a provisional ARM off the coast of Rio de Janeiro. After leaving this first ARM, the turtle traveled over 620 km towards the coast of Santa Catarina, the southern limit of movements recorded in this study; B) Tag 140732's main ARM (III) off São Paulo and Paraná (PR) state. This olive ridley stayed for 171 d in the main foraging core area then started remigration movement (1673 km) before reaching a secondary ARM (IV) off the southern coast of Bahia for 25 days before resuming migration. The last transmission was about 400 km from the nesting area in Sergipe, after 337 d. The remigration track shows a partial overlap with the post-reproductive directional movement migratory path; C) Tag 140737's primary (V) and secondary (VI) ARM occurred outside of the main core area identified for olive ridleys at the southeastern Brazilian continental shelf. This olive ridley switched between area two ARMs, one located on the northern coast of Rio de Janeiro and the second off Espírito Santos state, with residency times of 126 and 27 days respectively.

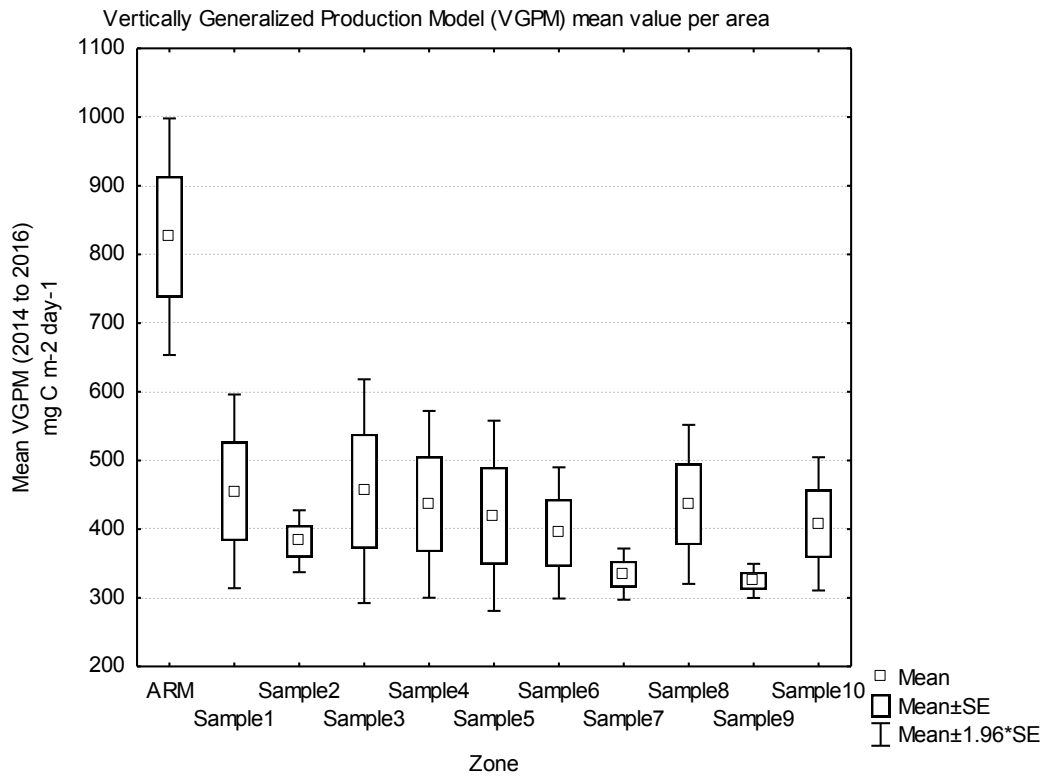


Fig. S3. Mean primary productivity (VGPM) along the inferred foraging ARMs and the ten sets of randomly selected samples areas.

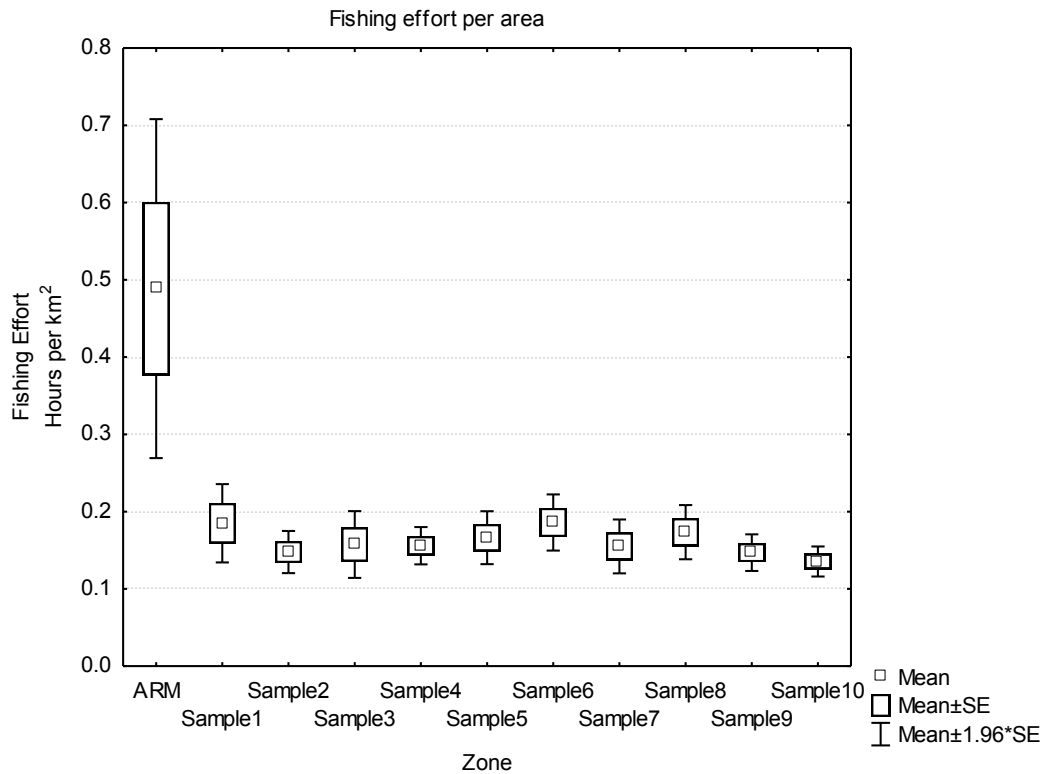


Fig. S4. Mean fishing effort (hours per km²) along the inferred foraging ARMs and the ten sets of randomly selected samples areas.

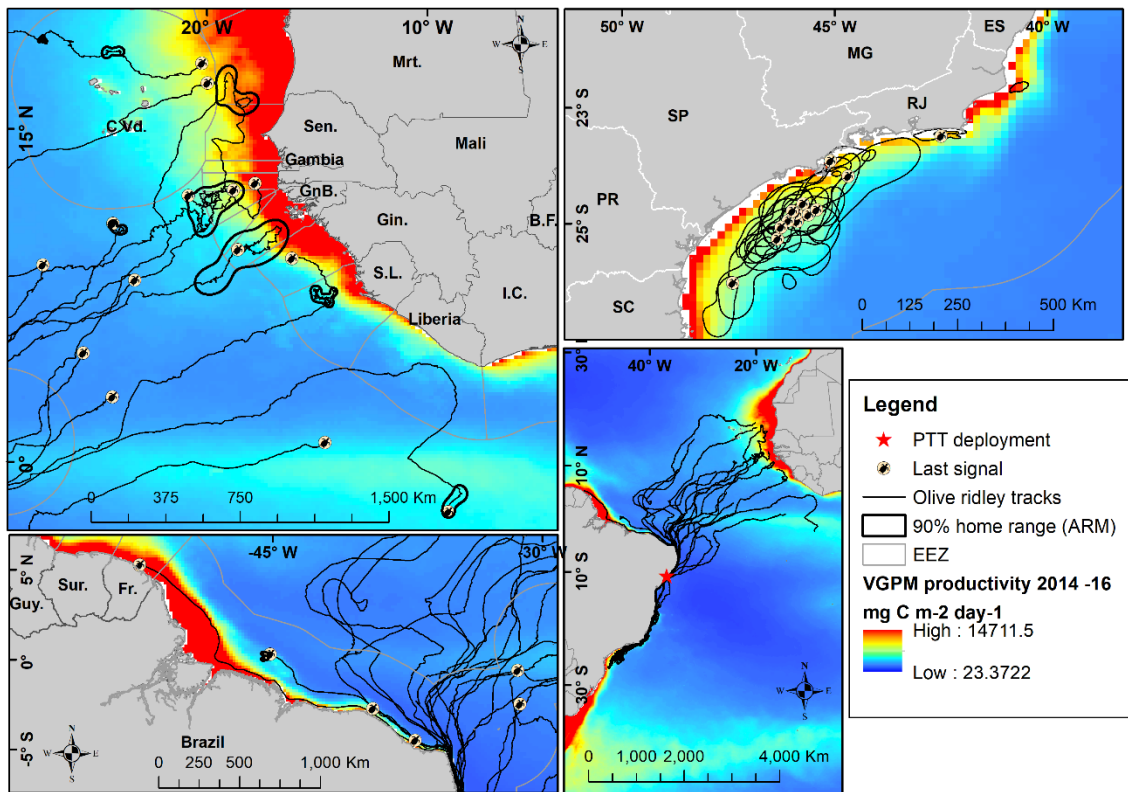


Fig. S5. Olive ridley individual inferred foraging ARM home ranges and mean primary productivity (2014 to 2016) values. The ARM home ranges had a partial overlap with high productivity areas along the oceanic west Africa areas and southern Brazilian continental shelf.

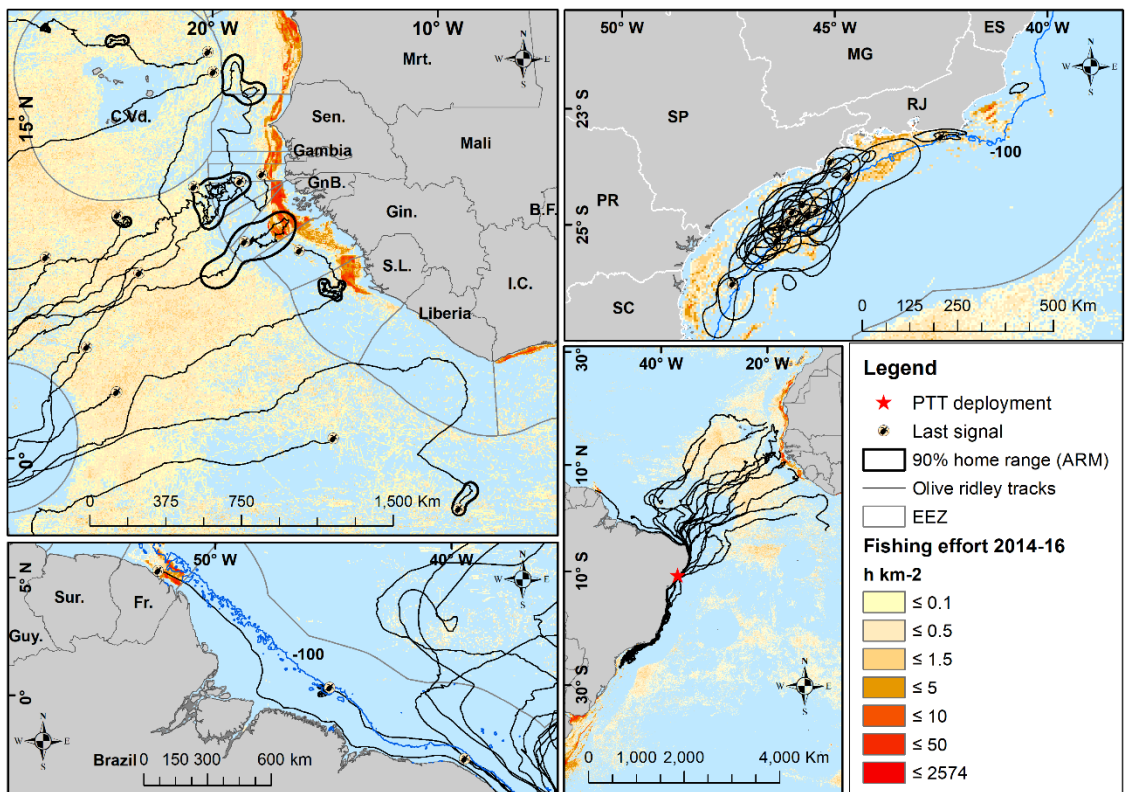


Fig. S6. Olive ridley individual inferred foraging ARM home ranges and mean daily fishing effort (2014 to 2016). The ARM home ranges had a partial overlap with high fishing effort areas along the oceanic west Africa and southern Brazilian continental shelf. The oceanic olive ridleys tracks overlap areas of high fishing effort as well.