Migratory connectivity analysis

by EURING Migration Atlas

***Sylvia atricapilla* (EURING code 12770)**

1.1 Connectivity between individuals

The analysis evaluated 282 individuals (564 encounters) filtered from a total of 596664 records in the EURING databank which were considered for the Atlas. The species shows a significant connectivity from clustering, with a number of first-level clusters = 6 (Table 12770-1; Figure 12770-1).

Table 12770-1. Results from the migratory connectivity analysis. For each cluster, the degree of connectivity (r_M), its statistical significance (p-value) and 95% confidence interval limits are shown. When the p-value is less than or equal to 0.1, the degree of clustering structure (oasw) and the best number of clusters identified are reported.

Cluster name	Level of clustering	N individuals	Migratory connectivity (r_M)	p-value	Lower 95% confidence limit	Upper 95% confidence limit	Best number of clusters	oasw
0	0	282	0.538	0.001	0.452	0.637	6	0.676
1	1	56	0.137	0.029	0.037	0.343	2	0.442
2	1	8	-	-	-	-	-	-
3	1	68	0.675	0.001	0.553	0.988	3	0.637
4	1	19	-	-	-	-	-	-
5	1	91	1.000	0.001	0.996	1.000	7	0.821
6	1	40	1.000	0.001	1.000	1.000	7	0.929
31	2	1	-	-	-	-	-	-
32	2	9	-	-	-	-	-	-
33	2	58	0.857	0.001	0.538	1.000	9	0.695
51	2	26	0.944	0.001	0.582	1.000	2	0.813
52	2	44	0.994	0.001	0.983	1.000	6	0.873
53	2	6	-	-	-	-	-	-
54	2	2	-	-	-	-	-	-
55	2	8	-	-	-	-	-	-
56	2	2	-	-	-	-	-	-
57	2	3	-	-	-	-	-	-
61	2	18	-	-	-	-	-	-
62	2	7	-	-	-	-	-	-
63	2	2	-	-	-	-	-	-
64	2	1	-	-	-	-	-	-
65	2	4	-	-	-	-	-	-
66	2	3	-	-	-	-	-	-
67	2	5	-	-	-	-	-	-
331	3	1	-	-	-	-	-	-
332	3	14	-	-	-	-	-	-
333	3	4	-	-	-	-	-	-

Cluster name	Level of clustering	N individuals	Migratory connectivity (r_M)	p-value	Lower 95% confidence limit	Upper 95% confidence limit	Best number of clusters	oasw
334	3	6	-	-	-	-	-	-
335	3	1	-	-	-	-	-	-
336	3	20	0.984	0.001	0.893	1.000	5	0.881
337	3	8	-	-	-	-	-	-
338	3	1	-	-	-	-	-	-
339	3	3	-	-	-	-	-	-
511	3	25	0.800	0.001	0.511	1.000	9	0.760
512	3	1	-	-	-	-	-	-
521	3	10	-	-	-	-	-	-
522	3	6	-	-	-	-	-	-
523	3	20	-	-	-	-	-	-
524	3	1	-	-	-	-	-	-
525	3	6	-	-	-	-	-	-
526	3	1	-	-	-	-	-	-

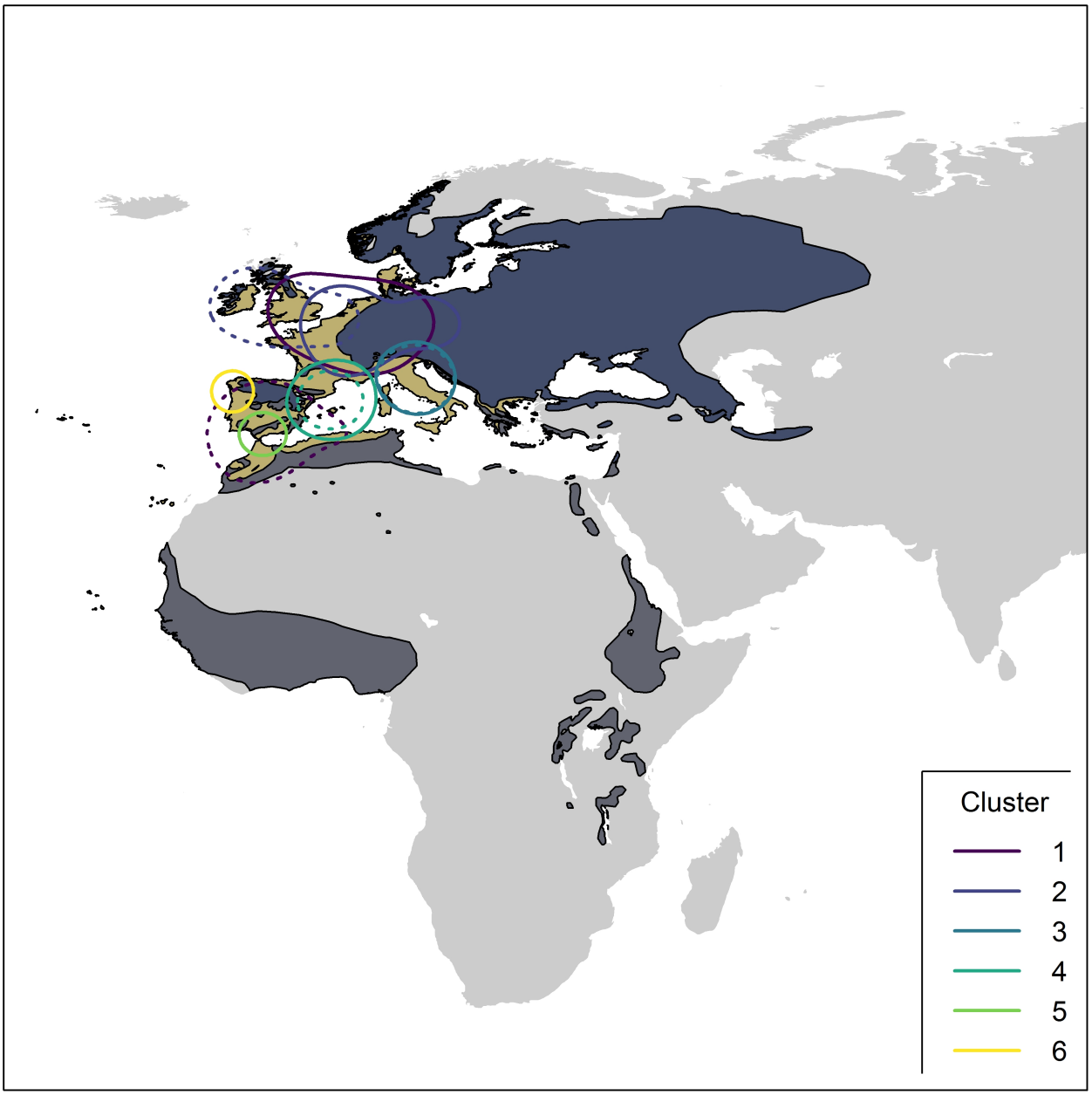

Figure 12770-1. Map showing 95% kernel contours of of first-level clusters identified by the migratory connectivity analysis, if any, or 95% kernel contours of all encounters, in case of no clustering structure. Solid lines indicate the clusters in the breeding range, dotted lines those in the non-breeding range. Different contour colours correspond to different clusters, as reported in legend. The species distribution range is also shown (breeding range: blue; non-breeding range: dark grey; resident range: beige; from BirdLife International, 2019).

1.2 Sensitivity analysis

Results of power analysis and validation. Analyses at the species level were re-run on subsamples of individuals of decreasing size (100 repetitions per subsample size), according to simple random sampling of individuals (Figure 12770-2) and stratified sampling of individuals within the breeding range (Figure 12770-3) and the non breeding range (Figure 12770-4). For stratified sampling, we selected individuals with a

probability inversely proportional to the number of observation in each country. Figures below report the results of the procedure.

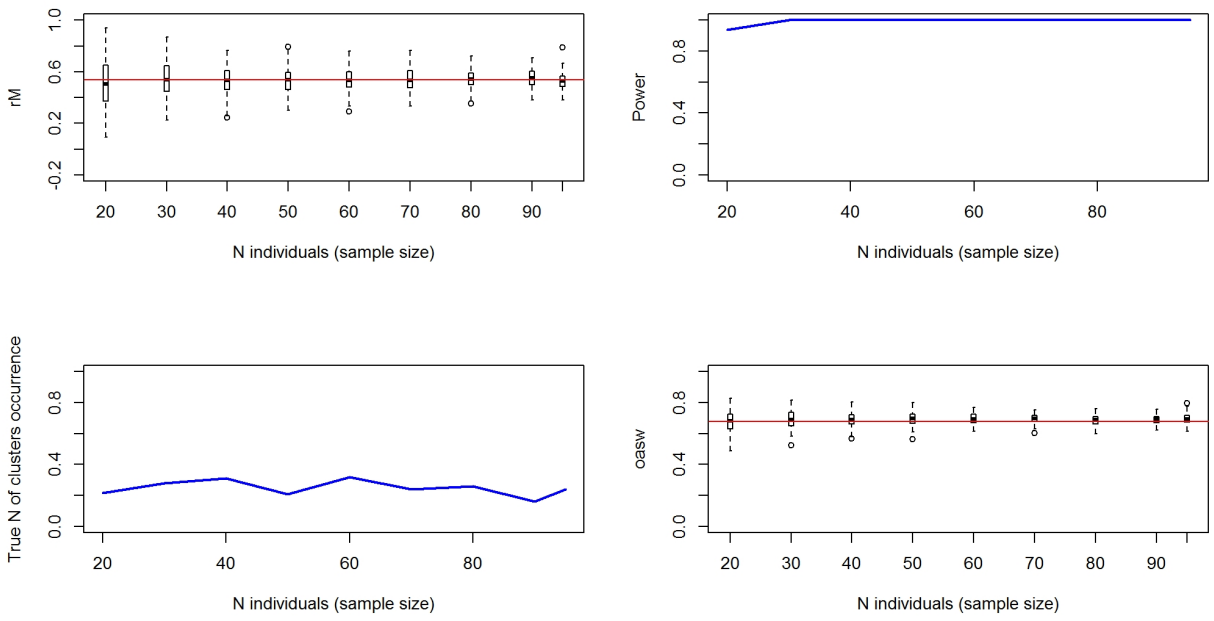

Figure 12770-2. Top left: simulated distribution (boxplots) and observed value (red line) of connectivity. Top right: Simulated power of the analysis (i.e. proportion of times the analyses on the subset of individuals was significant). Bottom left: Proportion of times the analysis provides the observed best number of cluster. Bottom right: simulated distribution (boxplots) and observed value (red line) of clustering intensity.

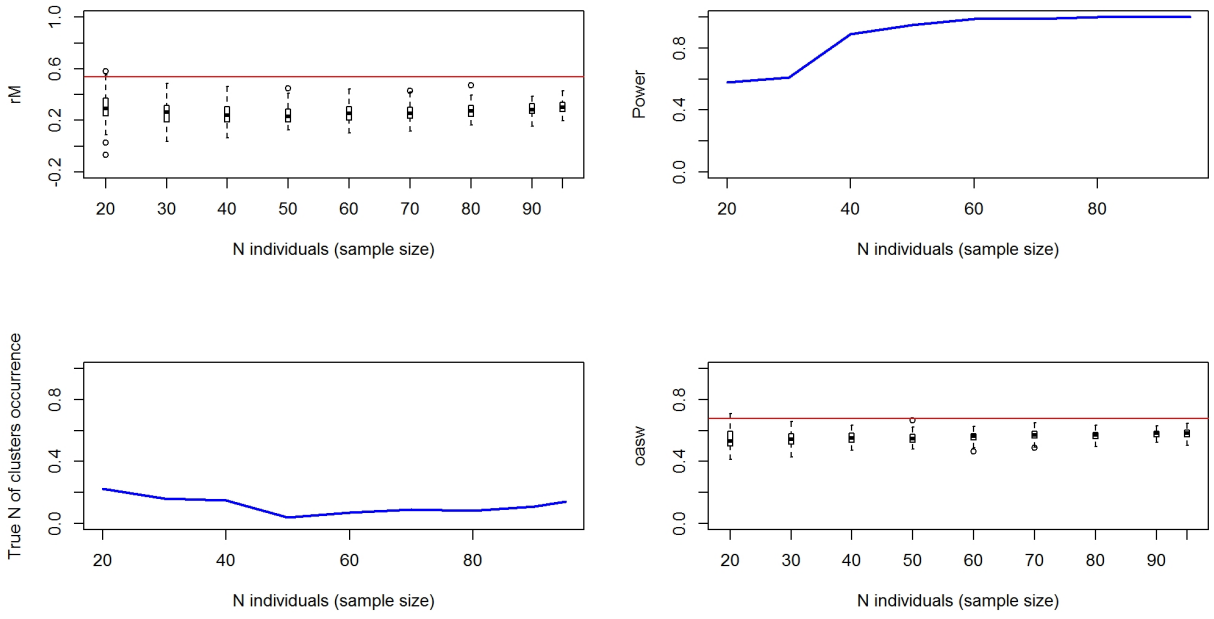

Figure 12770-3. Top left: simulated distribution (boxplots) and observed value (red line) of connectivity. Top right: Simulated power of the analysis. Bottom left: Proportion of times the analysis provides the

observed best number of cluster. Bottom right: simulated distribution (boxplots) and observed value (red line) of clustering intensity.

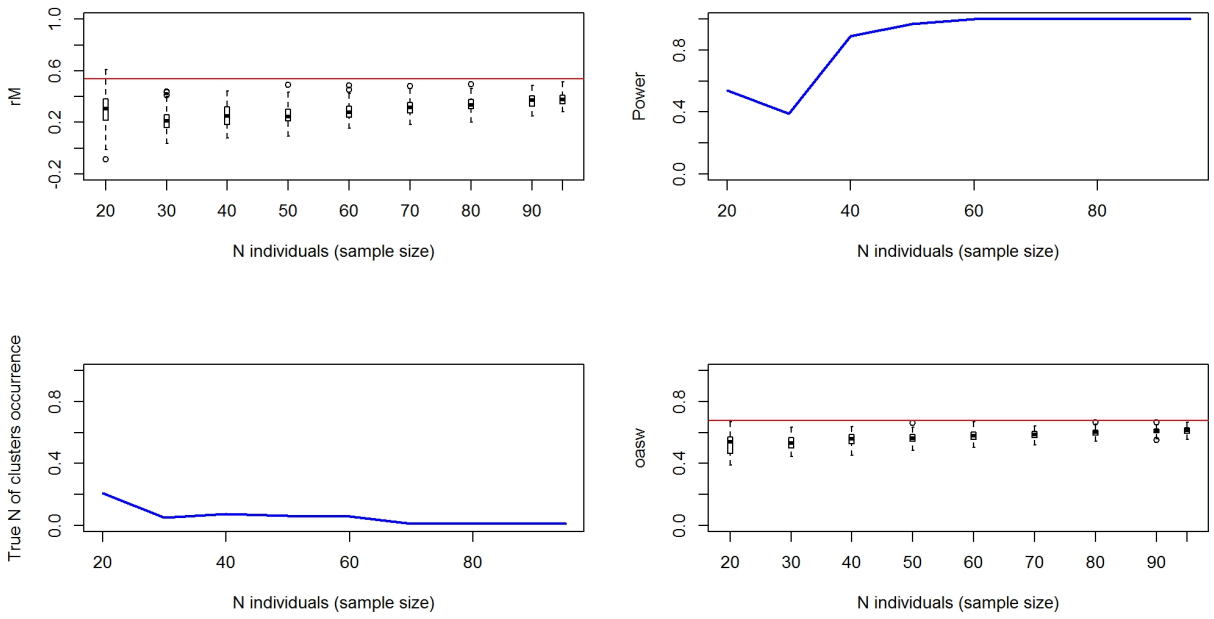

Figure 12770-4. Top left: simulated distribution (boxplots) and observed value (red line) of connectivity. Top right: Simulated power of the analysis. Bottom left: Proportion of times the analysis provides the observed best number of cluster. Bottom right: simulated distribution (boxplots) and observed value (red line) of clustering intensity.

2. Connectivity between pre-defined regions

The species shows low connectivity (MC = 0.065; MC = 0.061 when adjusted for absolute abundance) between 7 breeding regions and 7 non breeding regions (Table 12770-2; Figure 12770-6).

Table 12770-2. Transition probabilities between pre-defined regions. Estimated abundance (number of individuals) in each breeding region is also reported.

Breeding region	Abundance	Non breeding region	Transition probability
Central Europe	26779100	North Africa	0.417
Central Europe	26779100	North-west Europe	0.125
Central Europe	26779100	South-central Europe	0.042
Central Europe	26779100	South-east Europe	0.042
Central Europe	26779100	South-west Europe	0.375
North Africa	1000	North Africa	1.000
North Europe	5569000	North Europe	0.333
North Europe	5569000	South-west Europe	0.667
North-west Europe	3194400	North Africa	0.357
North-west Europe	3194400	South-west Europe	0.571
North-west Europe	3194400	West Europe	0.071
South-central Europe	13094884	South-central Europe	0.985
South-central Europe	13094884	South-west Europe	0.015
South-west Europe	14725266	South-west Europe	1.000

Breeding region	Abundance	Non breeding region	Transition probability
West Europe	7031627	North Africa	0.074
West Europe	7031627	North-west Europe	0.074
West Europe	7031627	South-central Europe	0.037
West Europe	7031627	South-west Europe	0.741
West Europe	7031627	West Europe	0.074

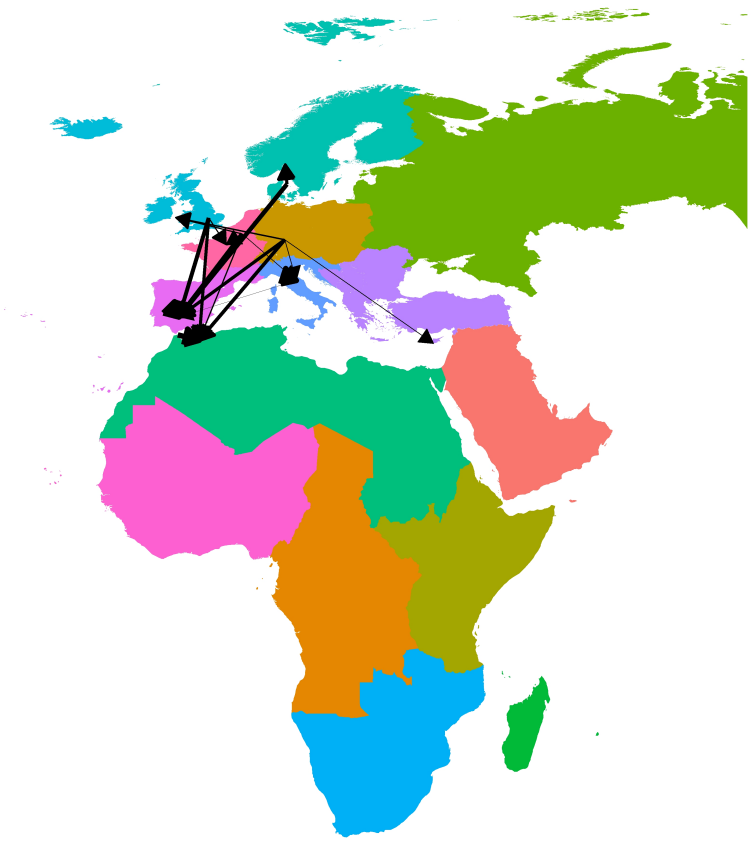

Figure 12770-6. Map showing pre-defined regions in different colours, with black arrows linking centroids of individual encounters in different regions. Arrow width is proportional to transition probability.

Reference

BirdLife International and Handbook of the Birds of the World (2019). Bird species distribution maps of the world. Version 2019.1. Available at http://datazone.birdlife.org/species/requestdis.