

Data Descriptor

Ecological and Functional Traits in 99 Bird Species over a Large-Scale Gradient in Germany

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Abstract: A gap still exists in published data on variation of morphological and ecological traits for common bird species over a large area. To diminish this knowledge gap, we report here average values of 99 bird species from three sites in Germany from the Biodiversity Exploratories on 24 ecological and functional traits. We present our own data on morphological and ecological traits of 28 common bird species and provide additional measurements for further species from published studies. This is a unique data set from live birds, which has not been published and is available neither from museum nor from any other collection in the presented coverage.

Data Set: available as the supplementary file.

Data Set License: CC-BY

Keywords: biodiversity exploratories; birds; Germany; ecological traits; morphological traits

1. Background

Variation in the structure of ecological communities through space and time is a fundamental property of biodiversity (e.g., [1–3]). Mostly, taxonomic measures of diversity are used for detection of patterns in structural variation, e.g., species richness. However, many times, species are more or less similar, for example in their functional characteristics [1,2], showing the imperative character of studies including functional diversity and therefore functional traits. Understanding spatial and temporal patterns of functional diversity and their determinants is important because different functional trait distributions may imply the operation of different assembly processes (e.g., [4]). Previous studies of spatial and temporal variation in functional diversity have used a limited number of functional group classes and a discontinuous measure of diversity (e.g., [5,6]), but largely lack continuous measures of functional diversity and functional traits.

While functional trait research has led to greater understanding of the impacts of biodiversity in ecosystems [7], so far functional trait approaches have not been widely applied with continuous functional/ecological traits for lack of data. Even in bird diversity studies, and European bird studies in particular, with relatively good baseline datasets of functional traits available [8–10], continuous measures of functional traits remain limited. However, widely applicable indicators of biodiversity are needed to monitor the responses of ecosystems to global change and design effective conservation schemes [11]. Among the potential indicators of biodiversity, those based on the functional traits of species and communities are probably the best suited [7,11], because they can be generalized to similar

habitats and can be assessed by relatively rapid field assessment across eco-regions [11]. Nevertheless, there is still a gap in published data on variation of morphological traits or ecological traits for common bird species over a large area. To improve this knowledge gap, we report here average values of 99 bird species from three sites in Germany from the Biodiversity Exploratories [12] on 24 ecological and functional traits in total. We amend and complete our own data sets by data from already published studies [13–25]. We present (1) our own data on morphological and ecological traits of 28 common bird species and 2158 individuals at three sites in Germany and (2) provide further measurements from other publications available for in total 99 bird species. This is a unique data set, which has not been published or the data made available, neither from museum nor from any other collection in the presented coverage.

2. Data Description

This data set contains data on ecological and morphological traits of birds across three major sites in Germany for 99 bird species. The data covers 2014 and 2015 breeding season in the three areas. The baseline data are amend by the addition of morphological traits compiled through a set of available sources [26–31]. For each bird captured, we measured several relevant ecological (four own plus six others) and morphological traits (six own plus eight others).

3. Data

The data are separated into two parts; a table with own data (Table 1) and data compiled from other sources (Table 2).

All traits varied considerably between species (Table 1; Figure 1). Within species and between the three sites, 64% of all tests were not significant. The one-third of cases with a significant difference were equally divided among ecological (28) and morphological traits (24) (Table A1).

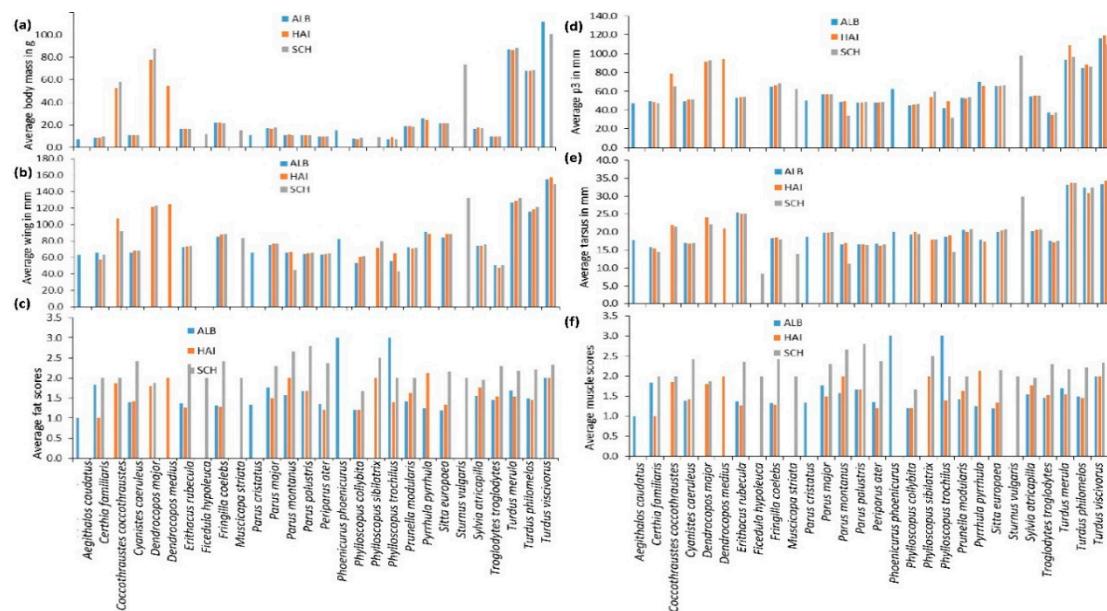


Figure 1. Selected traits of the most common bird species in the three Biodiversity-Exploratories in 2014 and 2015; ALB: Schwäbische Alb in the southwest, HAI Hainich-Dün in the center, and SCH Schorfheide-Chorin in the northeast of Germany. (a) Average body mass in grams; (b) average wing length in mm from tip to bow, flattened; (c) average fat scores (following [28,32]); (d) average length of primary three (counted from outside) in mm; (e) average tarsus length (back of the intertarsal joint to the bend of the toe at the metatarsal joint [28] in mm); (f) average muscle scores (following [28,32]).

Table 1. Data sets of ecological and morphological traits of 28 common bird species in Germany (own data, metadata see Table 3). Gray-shaded areas are what we consider ecological traits, all others are morphological traits. n/a indicates that data was not available from other source or we could not measure this trait on the birds.

Species	Total N	Fat score (Mean)		Muscle Score (Mean)		Body Mass Mean		Bill Height Mean		Bill Width Mean		Bill Height Mean		Tarsus Mean		Wing Mean		P3 Mean											
		± SD	Min	Max	± SD	Min	Max	± SD	Min	Max	± SD	Min	Max	± SD	Min	Max	± SD	Min	Max										
<i>Aegithalos caudatus</i>	3	1.00	2.50	7.35	0.49	3.27	0.20	3.13	3.41	3.20	0.25	3.02	3.38	5.92	0.21	5.77	6.07	17.73	0.90	17.09	18.37	63.13	2.65	61.25	65.00	47.00	2.12	45.50	48.50
<i>Certhia familiaris</i>	45	1.73	3.14	9.32	3.44	3.01	0.51	2.44	4.90	3.03	0.75	2.36	5.57	12.69	2.11	9.70	18.72	15.10	2.85	7.58	21.21	62.53	12.33	32.75	89.00	48.31	7.60	24.50	65.50
<i>Coccothraustes coccothraustes</i>	12	1.90	1.70	53.73	4.37	15.59	0.82	14.60	17.00	13.78	0.73	12.72	14.72	18.94	0.78	17.66	20.32	21.83	0.56	20.85	22.75	102.68	17.74	54.50	118.00	74.75	11.98	41.00	81.25
<i>Cyanistes caeruleus</i>	106	2.03	2.82	11.00	0.65	4.28	0.26	3.36	4.88	3.98	0.51	2.48	5.00	7.80	0.51	6.67	8.89	16.77	0.61	15.43	18.09	67.84	2.31	62.25	77.50	51.17	3.44	26.50	56.75
<i>Dendrocopos major</i>	26	1.85	1.86	84.56	16.71	8.69	0.55	7.66	9.41	9.54	1.03	7.58	11.16	26.42	1.91	23.19	29.24	22.80	4.43	12.24	25.64	122.17	31.61	69.50	142.50	92.42	22.94	51.25	107.00
<i>Dendrocopos medius</i>	2	2.00	2.00	54.50	n/a	6.08	n/a	6.08	7.65	n/a	7.65	7.65	19.02	n/a	19.02	19.02	21.05	n/a	21.05	21.05	124.50	n/a	124.50	124.50	94.50	n/a	94.50	94.50	
<i>Erythacus rubecula</i>	380	1.65	2.52	16.39	1.30	3.62	0.25	2.84	4.74	4.45	0.36	3.24	5.94	9.96	0.81	6.53	12.11	25.25	1.19	12.92	26.93	73.05	5.30	34.50	78.50	53.60	4.99	26.75	74.75
<i>Ficedula hypoleuca</i>	2	2.00	2.00	11.75	n/a	n/a	n/a	0.00	0.00	n/a	n/a	0.00	0.00	7.74	n/a	7.74	7.74	8.44	n/a	8.44	n/a	n/a	0.00	0.00	n/a	n/a	0.00	0.00	0.00
<i>Fringilla coelebs</i>	210	1.64	1.91	21.97	1.28	7.02	0.41	5.61	8.25	6.37	0.44	4.92	8.04	11.92	0.75	9.30	13.77	18.24	0.86	9.81	22.06	86.71	10.99	42.75	96.50	66.16	8.22	32.25	73.75
<i>Muscicapa striata</i>	6	2.00	2.00	15.22	1.83	3.90	0.27	3.59	4.34	5.80	0.59	5.05	6.36	10.93	0.61	10.02	11.80	13.92	2.76	8.32	15.48	83.21	18.89	45.00	94.00	62.58	13.86	34.50	70.50
<i>Parus cristatus</i>	4	1.33	2.00	10.90	0.36	3.49	0.10	3.41	3.61	3.57	0.51	3.00	3.97	8.13	0.67	7.36	8.61	18.71	0.22	18.49	18.93	66.17	1.23	64.75	67.00	50.17	1.04	49.00	51.00
<i>Parus major</i>	329	1.89	2.49	17.36	1.26	4.46	0.29	3.70	6.25	4.78	0.53	3.25	5.98	10.21	0.69	7.61	13.39	19.91	0.94	9.34	26.30	76.11	5.74	36.50	82.00	57.01	3.97	27.25	62.00
<i>Parus montanus</i>	17	1.93	2.93	11.04	0.68	34.23	113.05	3.57	427.00	4.57	0.46	3.67	5.50	8.88	0.73	7.79	10.41	15.62	2.92	8.38	17.38	61.92	11.77	33.00	69.00	46.05	8.61	24.75	50.75
<i>Parus palustris</i>	34	1.84	2.78	11.09	0.40	4.10	0.20	3.63	4.50	4.33	0.38	3.67	5.15	8.82	0.53	6.97	9.67	16.58	0.33	15.54	17.20	64.42	6.45	31.50	69.50	48.17	4.42	25.50	52.00
<i>Periparus ater</i>	33	1.58	2.67	9.67	1.32	3.52	0.19	3.12	4.05	3.90	0.44	2.56	4.74	9.05	0.45	7.61	10.34	16.64	0.67	13.97	17.84	63.84	2.17	58.75	67.50	48.13	1.68	44.25	51.00
<i>Phoenicurus phoenicurus</i>	1	3.00	2.00	15.40	n/a	3.90	n/a	3.90	3.90	4.97	n/a	4.97	4.97	10.40	n/a	10.40	10.40	20.09	n/a	20.09	20.09	82.00	n/a	82.00	82.00	62.25	n/a	62.25	62.25
<i>Phylloscopus collybita</i>	13	1.31	2.85	7.86	0.60	2.73	0.34	2.41	3.59	3.58	0.31	2.95	4.23	8.49	0.55	7.42	9.60	19.67	0.75	18.51	21.52	58.04	9.32	30.00	68.00	45.46	2.89	40.75	51.25
<i>Phylloscopus sibilatrix</i>	3	2.33	3.00	9.15	0.71	3.14	0.42	2.81	3.62	3.76	0.57	3.11	4.10	8.23	0.58	7.79	8.89	17.91	0.65	17.35	18.63	76.92	5.00	72.00	82.00	58.00	4.77	53.50	63.00
<i>Phylloscopus trochilus</i>	13	1.75	2.75	8.48	1.12	2.84	0.37	2.34	3.35	3.72	0.27	3.27	4.05	8.46	0.72	6.80	9.28	17.88	3.57	9.46	20.83	58.31	13.58	28.00	70.50	44.03	10.38	21.75	54.00
<i>Prunella modularis</i>	39	1.59	2.37	18.69	1.20	3.96	0.24	3.50	4.41	5.08	0.27	4.39	5.73	10.96	0.54	10.00	12.45	20.56	0.84	19.12	23.32	72.07	2.03	68.00	77.00	53.19	4.38	29.50	57.50
<i>Pyrhula pyrrhula</i>	13	1.83	1.92	24.90	1.83	9.07	0.49	8.34	10.06	9.05	0.57	8.40	10.09	10.77	0.80	9.76	12.57	17.46	0.53	16.27	18.15	89.29	3.59	83.50	97.50	67.02	2.53	62.50	70.75
<i>Sitta europaea</i>	44	1.69	2.74	21.72	1.33	4.72	0.31	4.03	5.68	5.60	0.46	4.89	6.96	14.92	1.64	10.88	18.87	20.50	0.67	18.59	21.85	86.66	7.66	43.25	93.50	66.03	1.88	62.75	69.25
<i>Sturnus vulgaris</i>	1	2.00	2.00	73.34	n/a	7.29	n/a	7.29	7.59	7.59	n/a	7.59	7.59	21.53	n/a	21.53	29.89	n/a	29.89	29.89	132.00	n/a	132.00	132.00	97.50	n/a	97.50	97.50	
<i>Sylvia atricapilla</i>	316	1.73	2.18	17.22	1.49	3.83	0.29	2.85	6.40	4.99	0.42	3.81	7.47	10.63	0.65	8.85	12.26	20.47	0.91	10.60	23.97	74.93	3.03	36.50	88.00	55.27	5.39	27.25	67.50
<i>Troglodytes troglodytes</i>	78	1.74	3.21	9.95	0.89	2.82	0.22	2.01	3.38	3.22	0.31	2.47	4.28	10.25	0.73	8.20	11.59	17.40	0.67	15.75	18.54	49.56	3.77	26.50	54.25	36.60	3.02	17.75	40.00
<i>Turdus merula</i>	264	1.82	1.61	87.34	5.27	7.32	0.42	5.61	9.03	7.12	0.61	5.49	9.10	19.05	1.11	14.20	21.97	33.37	1.09	30.72	40.38	128.58	14.57	46.75	140.50	96.70	33.54	45.75	552.75
<i>Turdus philomelos</i>	151	1.72	1.63	68.35	7.51	6.40	0.42	5.65	8.48	6.92	0.64	5.01	9.16	15.84	1.04	12.81	22.05	32.11	2.14	15.53	35.29	117.96	12.59	58.75	161.00	85.73	12.74	43.25	117.50
<i>Turdus viscivorus</i>	13	2.09	1.83	107.68	9.80	7.55	0.65	6.65	9.02	7.82	0.66	6.95	8.94	17.63	1.15	15.60	19.63	33.43	0.90	32.15	34.65	153.85	6.06	143.00	160.50	114.88	5.72	102.75	121.25

Table 2. Compiled data for 99 common bird species in Germany (sources and metadata see Table 3). Gray-shaded areas are what we consider ecological traits, all others are morphological traits. n/a indicates that data are not available or published.

Species	Diet																								
<i>Accipiter gentilis</i>	carnivore	303.0	360.0	48.0	62	210.0	270.0	20.0	24.0	72.5	78.0	500	1350	36	41	36	40	3	4	93	127.0	1	20	4.2	0.2400
<i>Acrocephalus palustris</i>	insectivore	68.0	76.0	12.0	14	47.0	61.0	11.1	17.2	16.9	19.4	11	15	12	12	10	14	4	5	18	21.0	1	10	13.7	0.0072
<i>Acrocephalus scirpaceus</i>	insectivore	62.0	73.0	12.0	14	53.6	56.2	12.1	18.5	22.3	24.1	10	15	11	14	10	14	3	5	17	21.0	2	13	12.4	0.0074
<i>Aegithalos caudatus</i>	insectivore	57.0	64.0	13.0	15	80.0	92.0	6.0	7.0	16.0	17.5	7	9	14	14	15	15	8	12	16	19.0	1	11	n/a	n/a
<i>Alauda arvensis</i>	insectivore	98.0	118.0	18.0	19	59.5	74.0	12.8	16.3	22.5	27.0	33	45	11	14	16	16	3	5	30	36.0	2	11	7.3	0.0233
<i>Anser anser</i>	herbivore	425.0	480.0	75.0	90	58.0	74.0	129.0	150.0	73.0	82.0	2900	3700	27	28	50	60	4	9	147	180.0	1	27	n/a	n/a
<i>Anthus trivialis</i>	insectivore	13.4	15.8	14.0	16	56.6	65.5	81.0	91.0	20	23.2	20	25	12	14	10	14	4	6	25	27.0	2	9	10.1	0.0126
<i>Anthus pratensis</i>	insectivore	13.2	14.9	14.0	15	53.0	63.5	74.0	86.0	18.4	21.8	16	25	13	14	13	14	4	5	22	25.0	2	8	9.6	0.0143
<i>Apus apus</i>	insectivore	163.0	187.0	16.0	17	69.0	85.0	11.2	14.0	10.0	13.0	36	50	20	20	36	48	2	3	40	44.0	1	21	8.5	0.0150
<i>Ardea cinerea</i>	carnivore	425.0	470.0	90.0	98	155.0	175.0	100.0	125.0	135.0	165.0	1600	2000	25	28	42	50	3	5	155	175.0	1	36	2.8	0.3580
<i>Buteo buteo</i>	carnivore	366.0	424.0	50.0	57	193.0	222.0	20.0	25.5	69.5	82.0	600	1300	36	36	45	50	2	3	113	128.0	1	29	3.5	0.2540
<i>Carduelis cannabina</i>	granivore	78.0	86.0	13.0	14	50.0	57.0	11.0	13.2	14.7	16.9	15	20	12	13	12	14	4	6	22	25.0	2	10	12.0	0.0093
<i>Carduelis spinus</i>	granivore	69.0	77.0	11.0	12	40.0	48.0	11.9	14.1	13.0	14.6	10	14	13	13	15	15	3	5	20	23.0	2	14	12.0	0.0079
<i>Carduelis chloris</i>	granivore	82.0	91.0	14.0	16	51.0	59.0	14.5	20.9	16.5	18.9	25	34	12	15	13	16	4	6	25	27.0	2	13	12.1	0.0112
<i>Carduelis carduelis</i>	granivore	78.0	87.0	12.0	13	43.5	52.5	13.6	16.5	13.7	15.4	12	18	12	14	12	15	4	6	21	25.0	2	12	11.6	0.0099
<i>Certhia brachydactyla</i>	insectivore	59.0	67.5	12.0	13	50.4	64.5	15.3	23.0	14.8	17.2	8	12	15	15	15	15	5	6	17	20.0	2	6	n/a	n/a
<i>Certhia familiaris</i>	insectivore	60.0	67.0	12.0	14	52.0	70.0	13.9	21.2	13.0	17.0	8	12	15	15	15	15	5	6	18	21.0	2	9	n/a	n/a
<i>Ciconia ciconia</i>	omnivore	530.0	630.0	100.0	115	215.0	240.0	140.0	190.0	195.0	240.0	3000	3500	33	34	58	64	3	6	183	217.0	1	39	2.6	0.6508
<i>Coccothraustes coccothraustes</i>	granivore	102.0	112.0	17.0	18	46.0	54.0	18.7	22.6	19.8	23.0	48	62	12	12	11	11	4	6	29	33.0	1	13	n/a	n/a
<i>Columba oenas</i>	granivore	208.0	226.0	32.0	34	102.0	115.0	19.0	21.0	28.0	32.0	250	340	16	18	20	30	2	2	60	66.0	4	13	n/a	n/a
<i>Columba palumbus</i>	granivore	238.0	258.0	40.0	42	158.0	185.0	19.7	23.5	29.0	35.0	450	520	17	17	33	34	2	2	68	77.0	2	18	6.6	0.0904
<i>Corvus monedula</i>	omnivore	215.0	247.0	33.0	34	112.0	139.0	29.5	36.5	32.5	46.0	220	270	17	18	30	35	3	6	64	73.0	1	20	6.3	0.0618
<i>Corvus corax</i>	omnivore	375.0	442.0	54.0	67	222.0	246.0	68.0	84.0	64.5	73.5	1000	1500	20	21	40	40	3	6	115	130.0	1	21	4.0	0.2472
<i>Corvus corone cornix</i>	omnivore	286.0	335.0	44.0	51	179.0	219.0	47.0	58.0	53.0	62.0	540	600	17	18	30	32	4	6	84	100.0	1	18	4.7	0.1470
<i>Corvus corone corone</i>	omnivore	300.0	345.0	44.0	51	170.0	203.0	51.5	63.0	47.6	63.4	540	600	17	18	30	32	4	6	84	100.0	1	18	4.7	0.1470
<i>Coturnix coturnix</i>	granivore	106.0	119.0	16.0	18	35.0	43.0	10.5	13.0	24.5	27.5	70	135	17	20	11	19	8	13	32	35.0	2	11	11.6	0.0200
<i>Cuculus canorus</i>	insectivore	208.0	230.0	32.0	34	163.0	178.0	18.0	24.0	19.5	24.5	105	130	12	13	20	23	10	25	55	60.0	n/a	13	n/a	n/a
<i>Cyanistes caeruleus</i>	insectivore	65.0	71.0	11.0	12	50.0	57.0	5.5	11.5	16.0	18.5	9	12	13	15	19	20	6	15	18	20.0	1	15	n/a	n/a
<i>Delichon urbica</i>	insectivore	102.0	118.0	12.0	13	57.0	66.0	5.5	8.0	10.0	11.7	15	21	17	20	24	26	2	6	26	29.0	2	15	10.0	n/a
<i>Dendrocopos major</i>	insectivore	135.0	150.0	22.0	23	87.9	91.5	25.6	31.5	24.4	24.9	70	90	11	13	20	24	4	7	34	39.0	1	13	n/a	n/a
<i>Dendrocopos minor</i>	insectivore	89.0	99.0	14.0	15	56.0	65.0	15.5	19.0	14.0	16.5	18	22	12	14	18	20	4	6	25	27.0	1	8	n/a	n/a
<i>Dendrocopos medius</i>	insectivore	120.0	131.0	20.0	22	77.0	86.5	22.0	26.2	20.0	23.0	50	80	12	14	22	23	4	7	33	34.0	1	8	n/a	n/a
<i>Dryocopus martius</i>	insectivore	227.0	241.0	40.0	46	159.0	173.0	50.0	62.0	36.0	39.0	300	350	12	14	24	28	4	6	64	68.0	1	14	n/a	n/a
<i>Emberiza citrinella</i>	granivore	79.0	95.0	16.0	17	66.0	84.0	12.2	17.2	18.5	21.2	24	30	11	13	9	14	3	5	23	29.0	2	13	n/a	n/a
<i>Emberiza calandra</i>	granivore	88.0	105.0	16.0	19	57.0	81.0	15.1	18.7	22.5	27.1	38	55	12	13	10	14	3	5	26	32.0	1	n/a	n/a	n/a
<i>Erythacus rubecula</i>	insectivore	71.0	77.0	12.5	14	55.0	63.5	14.0	16.4	23.3	27.0	16	22	13	14	13	15	5	7	20	22.0	2	18	11.9	0.0101
<i>Falco tinnunculus</i>	carnivore	234.0	271.0	25.0	32	151.0	188.0	12.5	17.0	37.5	47.2	190	300	27	31	27	30	4	6	71	80.0	1	24	4.9	0.0777

Table 2. Cont.

Species	Diet	Wing length Min	Wing length Max	Body Length Min	Body Length Max	Tail Length Min	Tail Length Max	Bill Length Min	Bill Length Max	Tarsus Length Min	Tarsus Length Max	Body Mass MIN	Body Mass MAX	Incubation Time Min	Incubation Time Max	Nestling stage Min	Nestling stage Max	Clutch Size Min	Clutch Size Max	Wing Span Min	Wing Span Max	Maximum Broods Per Year	Maximum Age EURING	Wingbeat Frequency	Wing Area
<i>Ficedula hypoleuca</i>	insectivore	74.0	83.0	12.0	13	50.0	56.0	12.0	14.2	15.8	18.0	9	15	13	13	14	18	5	8	22	24.0	1	11	10.7	0.0091
<i>Ficedula parva</i>	insectivore	66.0	73.0	11.0	12	43.7	54.9	8.8	10.3	15.0	18.2	8	13	13	14	13	15	4	7	15	21.0	1	n/a	n/a	n/a
<i>Fringilla montifringilla</i>	granivore	85.0	96.5	14.0	16	56.0	70.0	14.5	17.8	17.5	20.3	23	29	12	12	14	14	6	7	25	27.0	1	15	10.8	0.0125
<i>Fringilla coelebs</i>	granivore	80.0	92.0	14.0	16	55.0	73.4	10.0	15.0	16.0	23.0	19	24	12	13	12	15	4	5	25	28.0	2	14	10.8	0.0130
<i>Gallinago gallinago</i>	omnivore	128.0	140.0	23.0	28	46.0	61.0	62.5	75.0	31.0	36.5	80	120	20	20	21	21	4	4	44	47.0	1	19	8.8	0.0309
<i>Garrulus glandarius</i>	omnivore	168.0	195.0	32.0	35	139.0	163.0	32.5	42.0	39.2	45.3	140	190	16	16	20	20	3	6	52	58.0	1	17	6.3	0.0662
<i>Grus grus</i>	omnivore	545.0	610.0	96.0	119	103.0	220.0	105.0	118.0	220.0	260.0	4000	7000	28	30	65	70	2	2	180	222.0	1	18	n/a	n/a
<i>Hippolais icterina</i>	insectivore	73.0	82.0	13.0	14	47.0	60.0	14.5	17.5	20.0	23.0	12	22	13	13	13	13	4	5	21	24.0	1	11	12.4	0.0081
<i>Hirundo rustica</i>	insectivore	118.0	131.0	17.0	21	76.0	132.0	11.2	14.0	9.7	11.5	16	25	15	15	20	24	4	6	32	34.5	2	16	7.7	0.0140
<i>Jynx torquilla</i>	insectivore	82.5	93.0	16.0	17	60.0	67.0	15.5	17.3	18.3	20.5	30	45	12	14	18	22	7	10	25	27.0	2	10	10.2	0.0150
<i>Lanius collurio</i>	insectivore	88.0	100.0	16.0	18	64.2	83.0	12.0	17.0	25.0	29.0	21	40	14	16	12	12	4	6	24	27.0	1	8	10.2	0.0145
<i>Locustella naevia</i>	insectivore	61.0	68.0	12.0	13	51.0	59.0	11.5	13.5	19.0	21.0	11	15	13	15	10	12	5	6	18	21.0	2	5	14.7	0.0070
<i>Loxia curvirostra</i>	granivore	91.0	103.0	16.0	18	53.0	61.0	17.0	21.2	15.0	21.0	28	40	14	16	16	18	3	4	27	30.0	2	7	n/a	n/a
<i>Lullula arborea</i>	insectivore	87.0	97.0	14.0	15	48.0	54.0	9.5	12.0	20.0	23.0	24	36	14	14	11	13	3	4	27	30.0	2	9	9.7	0.0164
<i>Luscinia megarhynchos</i>	insectivore	77.0	86.0	15.0	17	61.0	68.0	16.5	18.2	26.3	29.4	18	27	14	14	13	14	4	5	23	26.0	1	10	11.1	0.0116
<i>Milvus milvus</i>	carnivore	483.0	535.0	56.0	73	310.0	390.0	25.1	29.0	51.0	61.0	750	1300	30	30	50	55	2	3	140	165.0	1	26	2.8	0.3040
<i>Milvus migrans</i>	carnivore	434.0	480.0	55.0	60	220.0	280.0	22.0	28.0	52.0	62.0	650	950	30	30	42	45	2	3	130	155.0	1	24	3.1	0.2744
<i>Motacilla flava</i>	insectivore	81.0	94.0	16.0	18	76.0	90.0	66.0	76.0	19.0	25.0	16	22	12	13	17	17	5	6	23	27.0	1	9	10.7	0.0103
<i>Motacilla alba</i>	insectivore	74.0	86.0	17.0	19	64.0	75.5	80.0	92.0	21.3	25.5	19	27	12	14	13	16	5	6	25	30.0	3	13	10.1	0.0129
<i>Muscicapa striata</i>	insectivore	85.0	94.0	14.0	15	56.0	65.0	14.8	17.8	14.1	16.0	13	19	12	14	11	15	4	5	23	25.0	2	11	10.6	0.0110
<i>Oenanthe oenanthe</i>	insectivore	90.0	102.0	14.0	16	49.0	60.0	15.3	18.8	27.6	30.0	17	41	14	14	14	16	3	6	26	32.0	2	10	9.0	0.0157
<i>Oriolus oriolus</i>	insectivore	144.0	163.0	22.0	25	74.9	94.5	20.0	26.5	20.0	24.0	65	67	14	15	14	15	3	4	44	47.0	1	7	n/a	n/a
<i>Parus cristatus</i>	insectivore	59.0	67.0	11.0	12	48.2	56.3	6.8	8.5	17.0	19.0	10	13	14	14	20	22	5	8	17	20.0	1	12	n/a	n/a
<i>Parus major</i>	insectivore	70.0	81.0	14.0	15	60.0	71.5	12.0	16.0	18.9	20.8	16	21	13	14	18	18	6	12	21	23.0	2	16	n/a	n/a
<i>Parus palustris</i>	insectivore	59.0	70.0	12.0	13	52.0	60.0	9.2	11.0	15.8	17.1	9	12	14	14	18	18	6	10	18	20.0	1	12	n/a	n/a
<i>Parus montanus</i>	insectivore	60.0	68.0	12.0	13	54.0	64.0	9.8	11.6	16.0	17.6	9	12	14	14	18	18	6	10	19	21.0	1	12	n/a	n/a
<i>Passer montanus</i>	granivore	67.0	72.0	12.5	14	52.0	57.0	12.3	14.6	16.3	18.3	19	25	11	13	13	15	4	6	20	22.0	3	14	n/a	n/a
<i>Passer domesticus</i>	granivore	73.0	83.0	14.0	15	54.0	60.0	12.0	15.5	16.5	19.7	22	32	12	14	13	17	2	3	21	25.0	3	20	n/a	n/a
<i>Periparus ater</i>	insectivore	59.0	65.0	10.0	12	46.0	53.0	11.2	12.0	15.9	18.3	8	10	14	14	16	23	6	10	18	19.0	2	10	13.5	0.0061
<i>Pernis apivorus</i>	insectivore	383.0	441.0	52.0	60	230.0	276.0	19.0	23.0	46.5	55.0	600	1100	30	35	40	44	2	2	125	135.0	1	29	3.3	0.2600
<i>Phasianus colchicus</i>	omnivore	220.0	274.0	55.0	90	468.0	560.0	27.0	32.5	64.0	77.0	900	1400	23	25	12	14	8	15	70	90.0	1	27	n/a	n/a
<i>Phoenicurus phoenicurus</i>	insectivore	75.0	85.0	13.0	15	53.5	61.5	12.8	15.8	19.7	23.3	12	20	12	14	13	17	5	7	21	24.0	1	10	11.0	0.0106
<i>Phoenicurus ochruros</i>	insectivore	80.0	91.0	13.0	15	58.0	65.0	13.4	16.3	22.1	24.1	14	19	13	13	16	17	5	6	23	26.0	2	12	10.4	0.0106
<i>Phylloscopus bonelli</i>	insectivore	57.0	68.0	11.0	12	12.0	13.1	11.0	13.5	18.3	19.7	7	9	13	14	10	12	4	6	16	20.0	1	n/a	n/a	n/a
<i>Phylloscopus trochilus</i>	insectivore	60.0	70.0	11.0	12	10.9	13.7	11.5	13.0	17.4	21.0	8	10	12	15	13	14	4	7	17	22.0	1	12	12.1	0.0071
<i>Phylloscopus sibilatrix</i>	insectivore	70.0	81.0	12.0	13	46.0	56.0	12.4	13.6	17.0	22.0	7	12	6	7	13	13	12	12	20	24.0	1	11	n/a	n/a
<i>Phylloscopus collybita</i>	insectivore	53.0	68.0	10.0	12	42.0	54.0	10.1	12.5	17.5	21.0	6	9	12	15	13	14	4	7	15	21.0	2	9	n/a	n/a
<i>Pica pica</i>	omnivore	186.0	215.0	40.0	51	193.0	296.0	36.0	44.6	41.0	52.6	200	250	17	18	22	24	4	8	53	60.0	1	22	6.8	0.0595

Table 2. Cont.

Species	Diet	Wing length Min	Wing length Max	Body Length Min	Body Length Max	Tail Length Min	Tail Length Max	Bill Length Min	Bill Length Max	Tarsus Length Min	Tarsus Length Max	Body Mass MIN	Body Mass MAX	Incubation Time Min	Incubation Time Max	Nestling stage Min	Nestling stage Max	Clutch Size Min	Clutch Size Max	Wing Span Min	Wing Span Max	Maximum Broods Per Year	Maximum Age EURING	Wingbeat Frequency	Wing Area
<i>Picus canus</i>	insectivore	143.0	155.0	25.0	26	92.0	104.0	36.0	44.0	25.3	28.5	125	165	14	15	24	28	7	9	38	40.0	1	6	n/a	n/a
<i>Picus viridis</i>	insectivore	159.0	171.0	31.0	33	95.0	104.0	42.5	53.0	28.5	33.0	180	220	15	15	23	27	5	8	40	42.0	1	16	n/a	n/a
<i>Prunella modularis</i>	insectivore	66.0	74.0	13.0	14	53.0	62.0	10.7	12.7	20.0	21.9	9	24	12	14	10	14	3	6	19	21.0	2	12	13.5	0.0090
<i>Pyrrhula pyrrhula</i>	granivore	62.0	95.0	14.0	16	64.0	73.0	14.0	15.9	17.0	18.4	21	27	13	14	16	18	4	6	22	26.0	2	13	n/a	n/a
<i>Regulus ignicapillus</i>	insectivore	48.0	56.0	9.0	10	36.0	44.0	12.0	14.6	15.6	21.2	5	7	7	15	15	20	7	10	13	16.0	2	n/a	21.3	n/a
<i>Regulus regulus</i>	insectivore	50.0	58.0	9.0	10	51.0	59.0	6.0	8.0	17.0	19.0	5	7	7	15	15	20	7	10	13	15.0	2	6	14.0	0.0053
<i>Saxicola rubetra</i>	insectivore	71.0	83.0	12.0	14	44.5	49.0	13.3	16.3	19.5	24.0	16	24	14	14	11	14	5	7	24	25.0	1	6	11.3	0.0095
<i>Saxicola rubicola</i>	insectivore	63.0	71.0	12.0	13	42.0	52.0	12.3	15.5	21.0	24.5	14	17	14	15	14	16	5	6	18	21.0	3	9	n/a	n/a
<i>Scolopax rusticola</i>	carnivore	190.0	214.0	33.0	35	80.0	90.0	65.0	80.0	34.0	40.0	250	420	22	23	15	20	4	4	56	65.0	1	16	n/a	n/a
<i>Sitta europaea</i>	insectivore	72.0	92.0	13.0	15	44.0	49.0	18.1	21.8	19.4	20.7	19	24	15	18	24	24	5	8	26	27.0	1	13	n/a	n/a
<i>Streptopelia turtur</i>	granivore	170.0	182.0	26.0	28	96.0	112.0	17.0	19.0	23.0	24.0	100	180	14	14	18	18	2	2	45	50.0	2	21	7.4	0.0400
<i>Strix aluco</i>	carnivore	268.0	298.0	37.0	39	154.0	185.0	25.5	29.5	44.0	53.0	330	590	28	30	32	37	3	6	94	104.0	1	23	n/a	n/a
<i>Sturnus vulgaris</i>	insectivore	121.0	138.0	19.0	22	59.0	66.0	21.5	29.5	27.1	30.3	75	90	12	13	20	20	4	6	37	42.0	2	23	10.1	0.0230
<i>Sylvia communis</i>	insectivore	67.0	77.0	13.0	15	57.0	67.0	49.2	57.4	21.7	22.5	12	18	12	12	9	13	3	5	19	23.0	1	9	13.0	0.0087
<i>Sylvia borin</i>	insectivore	74.0	83.0	13.0	14	49.0	58.0	10.2	15.1	17.0	21.8	16	23	12	12	10	10	4	6	20	24.0	2	15	12.2	0.0095
<i>Sylvia curruca</i>	insectivore	60.0	70.0	12.0	14	50.0	58.0	12.5	13.9	17.9	20.4	10	16	11	13	11	12	3	5	18	20.0	1	7	13.0	0.0073
<i>Sylvia atricapilla</i>	insectivore	72.0	80.0	13.0	15	56.0	62.0	13.2	16.1	18.7	21.5	14	20	13	14	10	13	3	6	22	24.0	2	12	13.3	0.0098
<i>Sylvia nisoria</i>	insectivore	80.0	93.0	15.0	17	64.0	79.0	15.9	18.3	22.0	28.0	21	35	12	15	12	15	4	6	23	27.0	1	12	n/a	n/a
<i>Troglodytes troglodytes</i>	insectivore	45.0	52.0	9.0	10	29.0	35.0	9.5	12.2	16.0	18.5	8	13	14	16	14	18	5	7	14	15.0	2	7	n/a	n/a
<i>Turdus merula</i>	insectivore	119.0	138.0	24.0	29	99.0	116.0	24.5	32.5	30.2	35.0	80	110	12	14	14	14	3	5	34	38.5	3	17	9.6	0.0297
<i>Turdus viscivorus</i>	insectivore	142.0	164.0	26.0	29	103.0	118.0	23.3	26.5	31.5	35.0	110	140	12	15	12	15	3	5	42	47.5	2	13	8.5	0.0358
<i>Turdus iliacus</i>	insectivore	109.0	127.0	19.0	23	69.0	89.0	18.5	23.5	28.0	32.0	55	75	12	14	12	14	5	6	33	34.0	2	18	n/a	n/a
<i>Turdus philomelos</i>	insectivore	109.0	123.0	21.0	24	78.0	90.0	22.0	24.0	31.8	33.8	65	90	12	14	13	14	3	5	33	36.0	2	18	10.2	0.0226
<i>Turdus pilaris</i>	insectivore	136.0	153.0	22.0	27	98.0	115.0	23.6	25.7	29.5	34.4	80	140	13	14	14	14	5	6	39	42.0	2	18	8.2	0.0335

Table 3. Metadata of the data set with detailed descriptor of the variables including unit (if applicable) and source.

Variable Name	Description	Unit	Source
Bill height (mean \pm SD, minimum, maximum)	Bill height measured at proximal end of operculum	mm	Own
Bill length (mean \pm SD, minimum, maximum)	Bill length measured from tip to proximal end of operculum	mm	Own
Bill length max	Maximum length of bill from tip to front of cranium	mm	[28] amended by [26]
Bill length min	Minimum length of bill from tip to front of cranium	mm	[28] amended by [26]
Bill width (mean \pm SD, minimum, maximum)	Bill width measured at proximal end of operculum	mm	Own
Body length max	Maximum body length of live bird from bill tip to longest tail feather	cm	[27]
Body length min	Minimum body length of live bird from bill tip to longest tail feather	cm	[27]
Body mass (mean \pm SD, minimum, maximum)	Live body mass of bird as measured in the field	g	Own
Body mass max	Maximum body mass as from literature	g	[27]
Body mass min	Minimum body mass as from literature	g	[27]
Clutch size max	Maximum number of eggs in clutch	#	[27]
Clutch size min	Minimum number of eggs in clutch	#	[27]
Fat (mean score)	Abdominal fat scores following Svensson [28] and Eck, Fiebig, Fiedler, Heynen, Nicolai, Töpfer, Winkler and Woog [32]	Score	Own
Diet	Major feeding group of species during breeding (roughly April to June)	Class	Own data (amended from [26])
Incubation time max	Maximum number of days from egg laying to hatching	days	[27]
Incubation time min	Minimum number of days from egg laying to hatching	days	[27]
Maximum age EURING	Minimum/Maximum age observed of banded birds (in years, rounded to the next year, if any month was specified)	#	[27]
Maximum broods per year	Minimum/Maximum number of broods observed per species so far	#	[27]
Muscle (mean score)	Abdominal muscle scores following Svensson [28]	Score	Own
Nestling stage max	Maximum number of days a nestling is on the nest, typically from hatching to flying	days	[27]
Nestling stage min	Minimum number of days a nestling is on the nest, typically from hatching to flying	days	[27]
P3 (mean \pm SD, minimum, maximum)	Mean value of primary 3 length measured on right and left body side of individual	mm	Own
Species	Scientific name species		
Tail length max	Maximum length of tail, measured after Svensson [28]	mm	[26]
Tail length min	Minimum length of tail, measured after Svensson [28]	mm	[26]
Tarsus (mean \pm SD, minimum, maximum)	Mean value of tarsus length measured on right and left body side of individual	mm	Own
Tarsus length max	Maximum length of tarsus ('Lauf' in von Blotzheim and Bauer [26])	mm	[26] amended by [29]
Tarsus length min	Minimum length of tarsus ('Lauf' in von Blotzheim and Bauer [26])	mm	[26] amended by [33]
Wing (mean \pm SD, minimum, maximum)	Mean value of wing length measured on right and left body side of individual	mm	Own

Table 3. Cont.

Variable Name	Description	Unit	Source
wing area	Area of the wing covered if stretched fully	m ²	[27]
Wing length max	Maximum wing length, measured from bow to tip (typically flattened)	mm	[28] amended by [26]
Wing length min	Minimum wing length, measured from bow to tip (typically flattened)	mm	[28] amended by [26]
Wing span max	Maximum wingspan of flattened and stretched wings from one wing tip to the other	mm	[27]
Wing span min	Minimum wingspan of flattened and stretched wings from one wing tip to the other	mm	[27]
Wingbeat frequency	Wingbeats per second	Hz	[27]

However, regarding the interspecies differences in traits between the different habitat categories, 88% of the tests were not significant. Here too, the cases with a significant difference were approximately equally divided among ecological (7) and morphological traits (11) (Table A2). A high number of significant interspecies trait differences exist for *Erythacus rubecula*, *Fringilla coelebs*, *Parus major*, *Sitta europaea*, *Sylvia atricapilla*, *Turdus merula*, and *T. philomelos* (Table A2).

4. Metadata

This section describes the descriptive metadata variables in the data set. In some of the data dimensions, additional information is added in order to provide a full assessment of the data. For each data dimension, we give the variable name, a short verbal description, the unit measured (if applicable) and the source (own and/or a citation if amended by other resource).

5. Methods

The study was part of the large-scale and long-term biodiversity research project ‘Biodiversity Exploratories’ (www.biodiversity-exploratories.de). The three regions differ in climate, geology, and topography but each is characterized by a gradient of forest management types typical for large parts of temperate Europe [12]. In each region, forest plots are selected to cover the whole range of forest management types, whilst minimizing confounding factors such as spatial position [12]. In this study, we sampled a subset of 70 plots (Schwäbische Alb: 28, Hainich-Dün: 21, Schorfheide-Chorin: 21) from which data for all taxa (see below) were available. The three sites in Germany are:

- (1) The Schwäbische Alb is located in southwest Germany (centroid about 48.41 North, 9.41 East).
- (2) The Hainich-Dün area is located roughly in the center of Germany in-between Schwäbische Alb and Schorfheide-Chorin (centroid about 51.15 North, 10.38 East).
- (3) The Schorfheide-Chorin in northeast Germany (centroid about 52.98 North, 13.76 East).

The distance from the northeast to the center exploratory is about 320 km and from the center to the southwest 270 km as the crow flies.

At each exploratory we captured birds at the forest plots (EP), as defined in [12]. All EPs in which we captured birds can be separated into four habitat categories, which represent most of the forest types of the Biodiversity Exploratories in general: natural beech (*Fagus sylvatica*; i.e., stands with $\geq 70\%$ of the canopy layer represented by beech trees with diameter at breast height ≥ 7 cm and at least unmanaged for 60 years), used beech stands (same as natural beech stands but with regular conventional beech forestry management), mixed-deciduous ($\leq 70\%$), and coniferous stands that either included Norway spruce (*Picea abies*; $\geq 70\%$ of spruce) in the Alb and Hainich-Dün, or Scots pine (*Pinus sylvestris*) in the Schorfheide-Chorin [12]. All plots are 100 m \times 100 m with at least an additional 30 m buffer of the same forest structure. The minimum distance between our EP centroids was 300 m. We captured each plot for in total three days in 2014 and two days in 2015, however with a time gap of at least 10 days between each capture day.

6. Capturing of Birds

We captured birds from April to June 2014 and 2015 in all three Exploratories at the same time frame. For capturing, we used (per Exploratories) eight mist nets of $9\text{ m} \times 2.5\text{ m}$ (size of mesh: 16 mm, nylon). We opened nets 30 min after local sunrise to hit the activity peak of birds and left nets open for five consecutive hours. For improved capture success we placed two playback stations (two per exploratory) close to the mist nets, playing territorial songs of our nine focal species (these are nine species we focus on for other studies: *Cyanistes caeruleus*, *Erithacus rubecula*, *Fringilla coelebs*, *Parus major*, *Periparus ater*, *Sylvia atricapilla*, *Troglodytes troglodytes*, *Turdus merula*, *Turdus philomelos*; [13]). We determined species, sex, and age wherever possible [28]. We screened each bird individual for ecto-parasites (ticks, lice, feather mites) at the head and the under wing, including the areas of primaries/secondaries covered by the under wing coverts. We scored the flight muscle and fat deposits on the abdomen and the furcular in classes following [32].

7. Handling Birds and Permits

Capturing, handling, and blood drawing were performed in compliance with laws and regulations of the European Union, plus German federal and state legislation. All permits were granted by the *Regierungspräsidium Tübingen, Referat Tierschutz* (TVG-Nr. FR1/14, 35/9185.81-3) for the Schwäbische Alb, by *Thüringer Landesamt für Verbraucherschutz, Dezernat 22, Allgemeines Veterinärwesen, Tierseuchenbekämpfung, Tierschutz* (TVG-Nr. 15-002/14, 2684-04-15-002/14) for the Hainich-Dün, and by the *Landesamt für Umwelt, Gesundheit und Verbraucherschutz, Potsdam* (TVG-Nr. Para-Aves 2347-3-2014) for the Schorfheide-Chorin. All land owners and land users approved access to the sites.

8. Measuring Birds

All captured birds were measured by three observers (one observer in each site during the field season) in the field to reduce measurements errors through observer bias. In addition, all observers performed a calibration workshop prior to the field season and the discrepancies of measured features was $\leq 0.05\text{ mm}$ between the observers.

We measured the bill length from tip to proximal end of the operculum, the bill width at the proximal end of the operculum and the bill height at the proximal end of the operculum with a digital caliper to the nearest of 0.01 mm. We determined length of tarsus to the nearest 0.1 mm, and primary feather three (counted from the outside) and wing (tip to carpal joint, flattened) to the nearest of 0.5 mm. To determine the degree of morphological asymmetry, we measured all bilateral traits on both sides of each individual for most individuals, but report only measurements of the left body side (tarsus, for holding position of bird while measured) or right (all other measurements) to reduce bias of different measurement types. For all measurements, the same observer took all measurements from the same individual, resetting the caliper before measuring the next trait. Tarsus length was measured with a digital caliper from the notch at the back of the intertarsal joint to the bend of the toe at the metatarsal joint [28].

We estimated muscle and fat scores (mean scores) in categories as a very rough measure for body condition, following Svensson [28] and Eck et al. [32] respectively.

9. Statistical Analysis

First, we tested the normality of the trait data per given bird species using R [34] and the Shapiro-Wilk test. For 65% of tests that included trait data with more than three observations, the trait data followed a non-normal distribution. Second, to test for differences between Exploratory or between habitat categories, we performed either a non-parametric Kruskal-Wallis test for non-normally distributed trait data or a one-way ANOVA for normally distributed trait data (Tables A1 and A2).

10. Data Amendments

In addition to our own measured data, we amended and summarized for 99 bird species measurements from other sources that have not yet been presented for the birds, or amended our own data. Our first source for ecological and morphological traits was [28], then we amended the information from [26,27]. Tarsus for *Prunella modularis* was added from [33] and tarsus of *Regulus regulus* was added from [31]. We ensured that the specific data from other sources (Table 2) are from the geographically shortest distance towards at least one of the three sites.

11. Bird Species Included

We provide data for *Accipiter gentilis*, *Acrocephalus palustris*, *Acrocephalus scirpaceus*, *Aegithalos caudatus*, *Alauda arvensis*, *Anser anser*, *Anthus pratensis*, *Anthus trivialis*, *Apus apus*, *Ardea cinerea*, *Buteo buteo*, *Carduelis cannabina*, *Carduelis carduelis*, *Carduelis chloris*, *Carduelis spinus*, *Certhia brachydactyla*, *Certhia familiaris*, *Ciconia ciconia*, *Coccothraustes coccothraustes*, *Columba oenas*, *Columba palumbus*, *Corvus corax*, *Corvus corone cornix*, *Corvus corone corone*, *Corvus monedula*, *Coturnix coturnix*, *Cuculus canorus*, *Cyanistes caeruleus*, *Delichon urbica*, *Dendrocopos major*, *Dendrocopos medius*, *Dendrocopos minor*, *Dryocopus martius*, *Emberiza calandra*, *Emberiza citrinella*, *Erythacus rubecula*, *Falco tinnunculus*, *Ficedula hypoleuca*, *Ficedula parva*, *Fringilla coelebs*, *Fringilla montifringilla*, *Gallinago gallinago*, *Garrulus glandarius*, *Grus grus*, *Hippolais icterina*, *Hirundo rustica*, *Jynx torquilla*, *Lanius collurio*, *Locustella naevia*, *Loxia curvirostra*, *Lullula arborea*, *Luscinia megarhynchos*, *Milvus migrans*, *Milvus milvus*, *Motacilla alba*, *Motacilla flava*, *Muscicapa striata*, *Oenanthe oenanthe*, *Oriolus oriolus*, *Parus cristatus*, *Parus major*, *Parus montanus*, *Parus palustris*, *Passer domesticus*, *Passer montanus*, *Periparus ater*, *Pernis apivorus*, *Phasianus colchicus*, *Phoenicurus ochruros*, *Phoenicurus phoenicurus*, *Phylloscopus bonelli*, *Phylloscopus collybita*, *Phylloscopus sibilatrix*, *Phylloscopus trochilus*, *Pica pica*, *Picus canus*, *Picus viridis*, *Prunella modularis*, *Pyrrhula pyrrhula*, *Regulus ignicapillus*, *Regulus regulus*, *Saxicola rubetra*, *Saxicola rubicola*, *Scolopax rusticola*, *Sitta europaea*, *Streptopelia turtur*, *Strix aluco*, *Sturnus vulgaris*, *Sylvia atricapilla*, *Sylvia borin*, *Sylvia communis*, *Sylvia curruca*, *Sylvia nisoria*, *Troglodytes troglodytes*, *Turdus iliacus*, *Turdus merula*, *Turdus philomelos*, *Turdus pilaris*, and *Turdus viscivorus*. Most of the bird species have very low captures and therefore these bird species need to be treated with caution in statistical analysis.

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Appendix A

Table A1. Test results for analyzing differences in variation of traits per species in-between the three Biodiversity Exploratories for the set of ecological and morphological traits of 28 common bird species in Germany based on own data. Gray-shaded and bold indicates p -values < 0.05 . Underlined p -values indicate ANOVA, otherwise a Kruskal-Wallis test has been performed. n/a indicates no data available for that trait or too low N.

Species	Fat Score	Muscle Score	Body Mass	Bill Height	Bill Length	Tarsus	Wing	p3
<i>Aegithalos caudatus</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Certhia familiaris</i>	0.06	0.10	0.34	0.07	0.49	0.73	0.28	0.47
<i>Coccothraustes coccothraustes</i>	0.51	0.20	0.11	0.46	0.25	0.30	0.49	0.14
<i>Cyanistes caeruleus</i>	0.00	0.00	0.52	0.15	0.94	0.48	0.20	0.33
<i>Dendrocopos major</i>	0.47	0.05	0.21	0.05	0.84	0.21	0.61	1.00
<i>Dendrocopos medius</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Erythacus rubecula</i>	0.00	0.00	0.48	0.00	0.00	0.00	0.19	0.89
<i>Ficedula hypoleuca</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Fringilla coelebs</i>	0.00	0.00	0.74	0.01	0.01	0.05	0.12	0.05
<i>Muscicapa striata</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Parus cristatus</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Parus major</i>	0.00	0.00	0.00	0.00	0.00	0.09	0.11	0.85
<i>Parus montanus</i>	0.33	0.25	0.72	0.91	0.27	0.04	0.39	0.67
<i>Parus palustris</i>	0.03	0.01	0.45	0.59	0.45	0.27	0.69	0.43
<i>Periparus ater</i>	0.02	0.12	0.97	0.75	0.73	0.63	0.43	0.90
<i>Phoenicurus phoenicurus</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Phylloscopus collybita</i>	0.79	0.17	0.05	0.21	0.22	0.45	0.38	0.76
<i>Phylloscopus sibilatrix</i>	0.48	1.00	n/a	0.81	0.78	0.87	0.35	0.39
<i>Phylloscopus trochilus</i>	0.34	0.34	0.01	0.18	0.18	0.75	0.26	0.12
<i>Prunella modularis</i>	0.20	0.00	0.38	0.05	0.00	0.34	0.14	0.46
<i>Pyrrhula pyrrhula</i>	0.01	0.48	0.18	0.25	0.00	0.21	0.18	0.00
<i>Sitta europaea</i>	0.00	0.00	0.97	0.05	0.58	0.02	0.25	0.89
<i>Sturnus vulgaris</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Sylvia atricapilla</i>	0.00	0.00	0.02	0.00	0.00	0.06	0.02	0.09
<i>Troglodytes troglodytes</i>	0.00	0.00	0.69	0.17	0.17	0.13	0.03	0.01
<i>Turdus merula</i>	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.09
<i>Turdus philomelos</i>	0.00	0.00	0.66	0.00	0.00	0.56	0.01	0.05
<i>Turdus viscivorus</i>	0.79	0.05	0.13	0.11	0.16	0.34	0.25	0.09

Table A2. Test results for analyzing differences in variation within species in-between the four different habitat categories for the set of ecological and morphological traits of 28 common bird species in Germany based on own data. Gray-shaded and bold indicates p -values < 0.05 . Underlined p -values indicate ANOVA, otherwise a Kruskal-Wallis test has been performed. n/a indicates no data available for that trait or too low N.

Table A2. *Cont.*

Species	Fat	Muscle	Body Mass	Bill Height	Bill Length	Tarsus	Wing	<i>p3</i>
<i>Phylloscopus collybita</i>	0.30	0.42	<u>0.93</u>	0.09	<u>0.70</u>	<u>0.54</u>	0.18	<u>0.57</u>
<i>Phylloscopus sibilatrix</i>	0.48	<u>1.00</u>	n/a	<u>0.81</u>	<u>0.78</u>	<u>0.87</u>	<u>0.35</u>	<u>0.39</u>
<i>Phylloscopus trochilus</i>	0.44	0.48	<u>0.25</u>	<u>0.38</u>	<u>0.00</u>	0.51	0.83	<u>0.87</u>
<i>Prunella modularis</i>	0.20	0.45	0.57	<u>0.72</u>	<u>0.19</u>	0.84	<u>0.60</u>	0.32
<i>Pyrrhula pyrrhula</i>	0.29	0.90	<u>0.22</u>	<u>0.29</u>	<u>0.01</u>	<u>0.26</u>	<u>0.76</u>	<u>0.18</u>
<i>Sitta europaea</i>	0.08	0.07	<u>0.43</u>	<u>0.24</u>	<u>0.01</u>	<u>0.87</u>	0.24	0.14
<i>Sturnus vulgaris</i>	n/a							
<i>Sylvia atricapilla</i>	0.01	0.55	0.07	0.08	<u>0.03</u>	<u>0.00</u>	0.02	0.01
<i>Troglodytes troglodytes</i>	0.98	0.48	0.75	0.90	0.38	<u>0.49</u>	0.97	0.62
<i>Turdus merula</i>	0.23	0.69	0.84	0.26	0.84	0.31	0.01	0.02
<i>Turdus philomelos</i>	0.15	0.03	0.95	0.15	0.70	0.13	0.66	0.56
<i>Turdus viscivorus</i>	0.35	0.24	<u>0.25</u>	<u>0.49</u>	0.85	0.03	0.51	0.60

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