A bird survey on western Vágar, Faroe Islands, in 2020 in relation to 1981

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(*Med et dansk resumé: En fugleoptælling på det vestlige Vágar, Færøerne, i 2020 i relation til 1981*)

Abstract In order to assess bird numbers, a quantitative atlas project from 1981 included a total count of the inland birds on the Faroe Islands. Here, I look at the changes in numbers of birds from 1981 to 2020 through a small-scale repetition of the 1981 atlas project on 11 predetermined routes on the western part of Vágar island. There were no significant differences in rank of bird numbers for any species except for Great Skua *Stercorarius skua* that increased remarkably in numbers between 1981 and 2020. However, most species showed a percentage change of > 25% even though the total count of individual birds had declined by 25% in 2020. Setting aside the significance of the results, the changes shown in some of the common species on the Faroe Islands are mainly supported by other studies. I compared the changes in bird numbers on western Vágar with data from other European countries, and in most instances the direction of change was not similar. The small scale of my census, along with differing threats and environmental conditions on the Faroe Islands compared with other European countries, are likely a big part of the reasons for this discrepancy. It would be highly beneficial to initiate a Common Bird Monitoring Scheme on the Faroe Islands, like the ones we see in most other European countries.

Introduction

In 1981, a quantitative bird atlas project organized by the National Museum of the Faroe Islands was carried out through which all inland birds as well as gulls and terns of the Faroe Islands were counted (Bloch 1981). The census excluded only three very abundant bird species, i.e. Northern Fulmar *Fulmarus glacialis,* Common Starling *Sturnus vulgaris,* and House Sparrow *Passer domesticus,* which were too time-consuming to include.

Previously, Joensen (1963) carried out a thorough

and all-encompassing bird census on the island of Skúvoy in 1961, a study that was later followed up by B. Olsen (1980) for cliff-nesting species, and by I. Olsen (2003) in 2001 and B. Olsen (2011) in 2010 for the inland breeding birds of the island. Counts of the seabird populations of the Faroe Islands were conducted in 1972 (Meltofte 1973, Olsen & Permin 1974, Dyck & Meltofte 1975), and a national census of Great Skua *Stercorarius skua* was conducted in 1961 (Bayes et al. 1964). More recently, counts of selected species were carried out on the island of Nólsoy (Aldará & Jensen 2019). The two most recent of these studies, conducted on Nólsoy and Skúvoy (Aldará & Jensen 2019, B. Olsen 2011), both suggested that some species had become less abundant, such as Arctic Skua *Stercorarius parasiticus,* Lesser Black-backed Gull *Larus fuscus* and Eurasian Whimbrel *Numenius phaeopus,* while others showed stable or increasing numbers, such as Great Skua and Greylag Goose *Anser anser.*

Here, I compare numbers from a census in 2020 of inland bird species on the western part of the island of Vágar with the numbers recorded in the same area during the bird atlas project in 1981. I discuss possible reasons behind any changes since 1981 through taking into account local factors and changes in bird numbers on a wider geographical scale.

Materials and methods

In the 1981 census, 37 experienced field ornithologists from the surrounding Nordic countries conducted the census over the entire Faroe Islands. The census period was defined so as to allow territorial behaviour to be displayed by as many bird species as possible. The period chosen was 12 June - 3 July, which was a compromise because Eurasian Oystercatcher *Haematopus ostralegus* was at the end of its breeding period, while species like Arctic Tern *Sterna paradisaea* and Purple Sandpiper *Calidris maritima* were still in the early stages of their breeding circle (Bloch 1985).

The country was divided into 18 districts each with two assigned observers (Fig. 1). Generally, the two observers performed the census for all of their assigned district. However, the islands of Vágar and Borðoy were more time-consuming than other sites, hence observers from other districts conducted the census counts on portions of these islands. Wherever possible, the observers used the line-transect technique and walked in parallel about 100 m apart, counting the territories between and to either side of them (Bloch 1981).

Each team plotted the surveyed routes on topographic maps (scale 1:20,000; Bloch 1981). All birds seen or heard were noted in notebooks, but only birds classified as possible, probable or definite breeders were noted on the maps in concordance with the procedures described in Sharrock (1976). Observers did not search for nests, and they followed the Danish Atlas terminology (Dybbro 1976) regarding behaviour, nests found etc.

In 2020, we duplicated the counts on western Vágar which was considered a representative area with respect to bird species and habitat types. Western Vágar included 12 routes in the 1981 census, but in 2020 we reduced the number to 11 routes (Fig. 2) due to only one resting Rock Dove *Columba livia* and some passing birds being registered on route 6 in 1981. Mean length of the selected routes was 7.74 km with a SD of 2.45 km. The area covered in the current census was approximately 17% of the area covered on the Faroe Islands in 1981.

The census in 2020 was conducted between 16 June and 2 July by five Faroese ornithologists. Like in the 1981 census, we tried to keep a steady, slow pace through-

Fig. 1. Map of the Faroe Islands with names of all islands, including Vágar (red circle). The numbers indicate the census districts used in 1981 (Bloch 1981).
Kort over Færøerne med navn på alle øerne, herunder Vágar (rød cirkel). Tallene indikerer de benyttede optællingsdistrikter i 1981 (Bloch 1981).

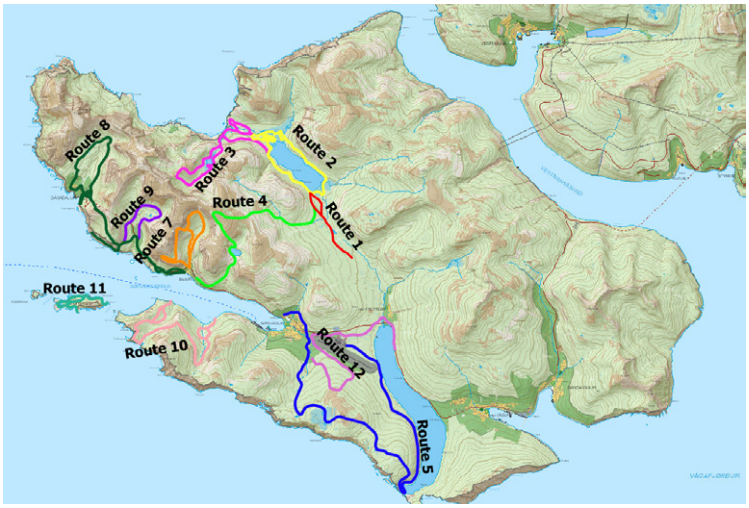

Fig. 2. The 11 routes on western Vágar chosen for the current census.
De 11 udvalgte ruter på den vestlige del af Vágar anvendt til den aktuelle optælling.

routes to avoid bias from different walking speed across differing terrains. The census was not conducted in winds above 7.9 m/s (Beaufort force 4), in visibility below 2000 m or in persistent precipitation, because these conditions may hamper bird activity and thus their detection (McCracken 1993). The routes were visited only once, except for Route 2 which in 1981 was split into two different parts visited on two successive days due to weather and terrain conditions but was visited only once in 2020.

Using QGIS-software (GQIS.org 2020), I overlaid the old maps with new, updated satellite maps and plotted the routes into a GPS device, which could then keep the observers on the route during the surveys. As some routes were quite short, while others covered a large area, between one and nine and a half hours were spent conducting the census on the selected routes both in 1981 and in 2020, and with a comparable amount of time spent on each route.

I compared the sum of adult and fully fledged individuals of each species. This eliminated potential misclassifications and comparisons of very small numbers when birds were assigned to a breeding category, and this gave each individual bird the same weight in the comparison. I had access to the raw data from 1981, which had been recorded in the notebooks, including the circumstances associated with the record. This allowed me to compare the data on a detailed level, i.e. route by route.

Statistical analysis

Statistics were done using R 4.0.2 (R Core Team 2020) and the ggpubr package (v0.4.0; Kassambara 2020). Like most count data, at the species level our data converged towards Poisson distributions, however, with varying degrees of overdispersion and zero-counts, which for some species were difficult to account for given the limited data. Thus, I used the distribution free Wilcoxon Signed Rank test, carried out for one species at a time. The Wilcoxon Signed Rank test shows the probability of an overall change but does not say anything about the actual size of the differences in local numbers. Some species were encountered in very small numbers (≤ 10 in the total count for both years). For these birds, I only noted the number of individuals and made no statistical inferences.

Comparison with European populations

Comparisons were made with the Pan-European Common Bird Monitoring Scheme (PECBMS), the International Waterbird Census (IWC) and the Red List Assessments (BirdLife). However, only species showing a percentage change of $> 60\%$ from 1981 to 2020 were compared. The PECBMS has published a report including 170 common European bird species based on censuses from the period 1980-2019 (PECBMS 2021). The data were collected from 28 European countries and captured the long-term trend of changes in population sizes.

Similarly, the IWC published a report with long-term population trend assessments for 358 of the African-Eurasian Waterbird Agreement (AEWA) populations collected from over 90 countries across the African-Eurasian flyways. For the European populations, the trend assessments cover the period 1980-2018 (Nagy & Langendoen 2020).

Tab. 1. The number of individuals of the common bird species encountered on 11 routes surveyed on western Vágar, the Faroe Islands, in 1981 and 2020. The Interquartile Range (IQR) is equal to the difference between the upper and lower quartiles.
Antal individer af almindelige fuglearter observeret på 11 optællingsruter på den vestlige del af Vágar, Færøerne, i 1981 og i 2020. Interkvartilområdet (IQR) er forskellen mellem første kvartil og tredje kvartil.

Species *Art*	No. of individuals *Antal individer*		No. of routes with the species *Antal ruter med arten*	% difference *% forskel*	Median		IQR		Wilcoxon Signed Rank test (P)
	1981	2020			1981	2020	1981	2020	
Greylag Goose *Grågås*	27	33	8	22	0	1	0	3.5	0.40
Common Eider *Ederfugl*	20	4	3	-80	0	0	2	0	0.18
Rock Dove *Klippedue*	30	2	3	-93	0	0	1.5	0	0.18
Eurasian Oystercatcher *Strandskade*	489	379	11	-23	33	27	19.5	17.5	0.31
Eurasian Golden Plover *Hjejle*	33	65	9	97	1	2	2.5	8.5	0.15
Whimbrel *Småspove*	147	243	11	65	17	22	11.5	20.5	0.10
Common Snipe *Dobbeltbekkasin*	67	62	11	-8	6	5	5.5	3.5	0.96
Red-necked Phalarope *Odinshane*	2	14	3	600	0	0	0	1	0.18
Arctic Skua *Almindelig Kjove*	154	170	10	10	5	8	16.5	22.5	0.81
Great Skua *Storkjove*	9	92	7	922	0	4	0	15.5	0.02
Common Gull *Stormmåge*	16	9	3	- 44	0	0	0	0	1
Lesser Black-backed Gull *Sildemåge*	604	155	11	-74	23	1	33	15.5	0.20
Herring Gull *Sølvmåge*	10	93	5	830	0	0	1	14	0.11
Great Black-backed Gull *Svartbag*	101	128	9	27	3	4	8	8	1
Arctic Tern *Havterne*	494	121	6	-76	2	0	80	0.5	0.09
Common Raven *Ravn*	12	0	4	-100	0	0	1.5	0	0.01
Hooded Crow *Gråkrage*	27	6	8	-78	1	0	2.5	0.5	0.11
Meadow Pipit *Engpiber*	45	23	11	-49	3	1	3.5	3.5	0.14
Rock Pipit *Skærpiber*	49	69	10	41	1	3	5.5	6.5	0.33
Eurasian Wren *Gærdesmutte*	13	11	6	-15	0	0	0.5	0.5	0.29
Northern Wheatear *Stenpikker*	91	141	11	55	6	9	6.5	7.5	0.13
Total numbers *Samlet antal*	2440	1820	-	-25	33	65	85	117	0.97

The Red List Assessments are from the European Union (EU27) Red List Assessments (BirdLife International 2021), which included 544 bird species across 54 countries and territories in the period 1980-2018.

Results

In total, 32 inland bird species and larids were encountered on the 11 census routes: 21 common species (summation of all routes with >10 individuals) and 11 rare species (summation of all routes with ≤ 10 individuals). In 1981, the total number of individual birds was 2440 compared to 1820 in 2020 – a reduction of 25%. The 11 census routes showed variation with regards to changes in bird numbers but no apparent pattern was found. The Wilcoxon Signed Rank test showed no sig-

Tab. 2. Direction of change in bird numbers of eight selected species on western Vágar, the Faroe Islands, based on surveys in 1981 and 2020 and in Europe during the period 1980-2019. N/A = Not Applicable. UN = Unknown.
Retning af forandring i fugleantal hos otte udvalgte arter på den vestlige del af Vágar, Færøerne, baseret på undersøgelser i hhv. 1981 og 2020 og i Europa i perioden 1980-2019. N/A = Ikke relevant. UN = Uvist.

Species *Art*	Western Vágar *Vestlig Vágar*	PECBMS		IWC		Red List Assessments		Concordance *Overensstemmelse*
	Direction *Retning*	Direction *Retning*	Period *Periode*	Direction *Retning*	Period *Periode*	Direction *Retning*	Period *Periode*	
Common Eider *Ederfugl*	-	N/A	N/A	-	1986-2018	-	1980-2018	Yes *Ja*
Rock Dove *Klippedue*	-	N/A	N/A	N/A	N/A	UN	1980-2018	?
Oystercatcher *Strandskade*	-	-	1980-2019	-	1980-2018	-	1980-2018	Yes *Ja*
Golden Plover *Hjejle*	+	-	1981-2019	-	2005-2018	Stable *Stabil*	1980-2018	No *Nej*
Whimbrel *Småspove*	+	+	1984-2019	Stable *Stabil*	1996-2017	Stable *Stabil*	1980-2018	No *Nej*
Red-necked Phalarope *Odinshane*	+	N/A	N/A	N/A	N/A	-	1980-2018	No *Nej*
Great Skua *Storkjove*	+	N/A	N/A	N/A	N/A	+	1980-2018	Yes *Ja*
Lesser B-b. Gull *Sildemåge*	-	N/A	N/A	UN	N/A	+	1980-2018	No *Nej*
Herring Gull *Sølvmåge*	+	N/A	N/A	N/A	N/A	-	1980-2018	No *Nej*
Arctic Tern *Havterne*	-	N/A	N/A	N/A	N/A	Stable *Stabil*	1980-2018	No *Nej*
Hooded Crow *Gråkrage*	-	N/A	N/A	N/A	N/A	N/A	N/A	?

nificant difference in rank of bird numbers across the 11 census routes between 1981 and 2020 for any bird species ($P < 0.05$) except Great Skua whose numbers were approximately ten-fold higher in 2020 (Tab. 1).

Comparison with European populations

The increase in numbers of Great Skua corresponds well with European trends shown on the Red List (BirdLife International 2021; see Tab. 2). However, with regard to some of the common bird species that showed a large albeit non-significant percentage change, only the direction of change for Oystercatcher (decrease) agrees with European trends (BirdLife International 2021, Nagy & Langendoen 2020, PECBMS 2021). Eurasian Whimbrel showed an increase in numbers on western Vágar and in European populations reported by the PECBMS (2021), while the Red List and the IWC report the European populations as stable (BirdLife International 2021, Nagy & Langendoen 2020). The opposite is the case on Skúvoy where B. Olsen (2011) found Whimbrel to have decreased from 41 pairs in 1981 to 12 pairs in 2010. Red-necked Phalarope *Phalaropus lobatus,* albeit based on few observations, and Herring Gull both showed an increase in numbers on western Vágar, while the Red List showed a decrease for the European populations (BirdLife International 2021). Lesser Black-backed Gull showed a decrease in numbers on western Vágar, while it is reported as increasing in Europe in the Red List (BirdLife International 2021). Arctic Tern also showed a decrease in numbers on western Vágar, but was reported as stable in Europe (BirdLife International 2021). In contrast, Eurasian Golden Plover *Pluvialis apricaria* showed an increase in the current census and a decrease according to the PECBMS and the IWC, but is reported as stable by the Red List (BirdLife International 2021, Nagy & Langendoen 2020, PECBMS 2021).

Discussion

Changes in bird occurrences on western Vágar were non-significant for all bird species except Great Skua, probably due to low statistical power given the small numbers of routes that were surveyed. Great Skua has historically been heavily persecuted on the Faroe Islands but in recent years this persecution has declined (Aldará & Jensen 2019). This species is still considered a pest by many people, and both eggs, young and adults are crushed or killed. Nevertheless, the Great Skua has managed to increase significantly in numbers on western Vágar, from nine individuals in 1981 to 92 individuals in 2020 – an increase of 922%. This increase in Great Skua numbers was supported by the surveys carried out on Skúvoy in 2001 (I. Olsen 2003) and 2010 (B. Olsen 2011) and on Nólsoy in 2018 (Aldará & Jensen 2019). On Skúvoy the increase was reported to be 530%, from 46 individuals in 1981 to 290 individuals in 2010 (B. Olsen 2011). Likewise, on Nólsoy two skuas were reported in 1981 and 12 skuas in 2018, an increase of 500%.

Although not significant, counts of some common bird species showed large percentage changes that to some extent were supported by other studies on the Faroe Islands. Lesser Black-backed Gull, which showed a decline in numbers on western Vágar from 1981 to 2020, increased on Skúvoy from nine pairs in 1981 to 18 pairs in 2001 (I. Olsen 2003), decreasing again to four pairs in 2010 (B. Olsen 2011). Some of this decline is probably due to reduced quantities of fish discards because procedures regarding waste disposal at fish factories have been improved (Oro 1996, Oro *et al*. 2004) and bans on discarding at sea have been implemented. By contrast, Herring Gull *Larus argentatus* has increased in numbers both on Vágar and Skúvoy (I. Olsen 2003, B. Olsen 2011). The reasons for the difference in the change in numbers between the gull species are not clear.

A key prey species for many marine bird species in the North Atlantic is the lesser sand eel *Ammodytes marinus* (Rindorf *et al.* 2000). Sand eels are also the target of the largest (by weight) single species commercial fishery in the North Atlantic (ICES 2004). Bailey *et al.* (1991) found a 70% decline in the number of breeding pairs of Arctic Terns around Shetland by 1988 compared to 1981-1983 numbers. This was coupled with a severe decline of available sand eels. In the current project, we found that numbers of Arctic Terns had decreased by 76% since 1981, and this decline was supported by the study on Skúvoy in 2001 (I. Olsen 2003) as well as by a study by Olsen & Sørensen (2009). These authors reported a decline of roughly 50% in Artic Terns from 1981 to 2008, thought to be due to a low number of surviving young. Hence, much of the decrease in numbers of Arctic Terns from 1981 to 2020 found in the current project could possibly be attributed to the shortage of available sand eels around the Faroe Islands.

Oystercatcher, Whimbrel and Golden Plover are migratory birds with very different wintering areas in Europe and West Africa. Food supplies as well as other environmental conditions at the wintering and breeding sites can change and may differ between areas, which in turn can lead to worse conditions for some bird species than others (Aldará & Jensen 2019). In the 2020 census, the numbers of Whimbrel and Golden Plover had increased on western Vágar since 1981, while the Oystercatcher population had

The national bird of the Faroe Islands, the Eurasian Oystercatcher, appears to have decreased on the islands. Photo: Jonatan Kaasgaard.
Færøernes nationalfugl, Strandskaden (Tjaldur), synes at være gået tilbage på øerne.

decreased. The study by Aldará & Jensen (2019), which showed a decline in Oystercatchers of 84% from 1981 to 2018, supports our findings, yet their study also reported a decrease of Golden Plover of 61% over the same period. Hence, there appears to be some differences between islands in the change in numbers of certain bird species.

Bird numbers change over time, and any increase or decrease in numbers may be part of a long-term fluctuation, or the result of short-term changes. For instance, the Herring Gull has increased in numbers on western Vágar and Skúvoy since 1981 (I. Olsen 2003, B. Olsen 2011) but is otherwise in decline in Europe (Tab. 2). However, the European declines have been relatively short-term changes. Recent trend estimates for the UK indicated that over the past three generations, overall declines were of a far smaller magnitude than between 2000 and 2012 (JNCC 2018).

Data for the European population of Red-necked Phalarope indicated that the population appears to be stable (BirdLife International 2021). According to a study by Smith & Ellis (2011), the population has also been stable on the Faroe Islands for the last couple of years. However, on western Vágar, numbers showed a huge increase of 600%, since few Red-necked Phalaropes were observed in the reference year. Even though these results are non-significant, they suggest that the Red-necked Phalarope is gaining a foothold on the Faroe Islands, and a deeper investigation into this should be pursued in the near future.

There are a number of potential limitations to the present study. One important factor to consider is the representativeness of the two census years, i.e. 1981 and 2020. Both censuses were carried out during only one summer and may therefore perhaps be considered as mere snapshots of bird numbers. Weather conditions were comparable in 1981 and 2020, with the weather varying from wind free and cloudless periods to gales, rain and fog (Bloch 1981). Another factor is observer differences. Observer skill, enthusiasm, motivation, concentration, endurance, alertness and willingness, as well as visual and auditory acuity, can all critically influence counts, and these factors can vary from day to day or even from hour to hour (McCracken 1993). To minimize this variation, the use of skilled and trained ornithologists was an important component of the censuses.

Furthermore, changes in land use from 1981 to 2020 could potentially have affected the results, especially the areas around Route 8 and 9 where a new tunnel was built in 2006, and around Route 12 where an airport expansion was started in 2007 (Fig. 2). However, none of these changes were assessed to have resulted in significant changes in bird living conditions.

Finally, the difference in the numbers of birds counted on western Vágar in 1981 and 2020 did not correspond particularly well with the differences seen in European populations in the same period. Different threats and environmental conditions could possibly explain some of these differences. According to the European Red List (n.d.), the biggest threats to bird species in Europe are hunting and collecting of terrestrial birds, agricultural intensification, land abandonment, and habitat loss and degradation. On western Vágar, the biggest local factor in declines in bird numbers is probably food shortage, including the decreased availability of fish discards.

It is important to note that the data collected in the 2020 census was probably not very representative of the Faroe Islands as a whole. We conducted the census on only one part of one island, and consequently much variation regarding species and habitat is missing. In the 1981 census, about 100 different species were recorded on all the Faroe Islands, while we only recorded 32 species. Some species are simply not found on Vágar though they are present on other islands, while some species are found on Vágar but in much lower numbers, probably partly due to lack of suitable habitats, and yet others occurred in greater numbers. Nevertheless, the current census provides a reference for future local studies and some added value because it is the only census to cover nearly all species since 1981. That said, the limitations of a local study are clear. If more general conclusions are to be drawn about changes in bird numbers on the Faroe Islands, for example to assist future management, it would be highly beneficial to set up a common bird monitoring scheme like the ones we see in most other European countries.

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Resumé

En fugleoptælling på det vestlige Vágar, Færøerne, i 2020 i relation til 1981

I 1981 stod det Naturhistoriske Museum på Færøerne for et kvantitativt atlasprojekt af alle indlandsfuglene på øerne. I dette projekt har jeg set på ændringer i antal fugle fra 1981 indtil 2020 ved at gentage atlastællingen fra 1981, omend på en langt mindre skala, ved at lave totaloptællinger på 11 foruddefinerede ruter på den vestlige del af øen Vágar (Fig. 1 og 2).

Jeg kunne ikke påvise nogen statistisk signifikant ændring i fugleforekomsterne, for nogen anden fugleart end Storkjoven *Stercorarius skua*, der steg markant i antal (Tab. 1). Ikke desto mindre udviste de fleste fuglearter en procentuel forskel på > 25 %, og det totale antal fugle var faldet med 25 % i 2020. Ser man bort fra signifikansen af resultaterne, understøttes resultaterne for flere af de almindelige fuglearter dog af studier på andre af de færøske øer. Jeg sammenlignede også ændringerne i antal fugle på den vestlige del af Vágar med data fra andre europæiske lande, og i de fleste tilfælde fulgtes ændringerne ikke ad (Tab. 2). Den lille skala af undersøgelsen i 2020 kædet sammen med forskellige trusler og miljømæssige forhold på Færøerne sammenlignet med andre lande i Europa, kunne være en stor del af forklaringen bag dette.

Den aktuelle undersøgelse på Vágar er den første på Færøerne siden 1981, hvor næsten alle fuglearter er optalt, hvilket har en værdi i sig selv. Begrænsningerne ved en fugleundersøgelse i et mindre område er dog åbenlyse i forhold til at kunne drage generelle konklusioner om fugleforekomsterne på Færøerne og i forhold til fremtidig forvaltning af fuglebestandene. Det vil derfor være højst gavnligt at starte et egentligt fugleovervågningsprogram for almindeligt forekommende arter på Færøerne, således som vi ser det i de fleste andre europæiske lande i form af Common Bird Monitoring Schemes.

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