Bird Numbers 2022

Beyond the Atlas: challenges and opportunities

Programme and Abstracts

22nd Conference of the European Bird Census Council
4–9 April 2022, Lucerne, Switzerland

vogelwarte.ch

EBCC
European Bird Census Council
every bird counts

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Beyond the Atlas: challenges and opportunities

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Conference logo
The logo of the Conference pictures two species with different stories: the Red-crested Pochard *Netta rufina* and the Alpine Swift *Tachymarptis melba*, both occurring in Lucerne. The first winters on Lake Lucerne in important numbers and several couples breed; the second breeds in over 100 pairs in the city in buildings, church towers and the Water Tower ("Wasserturm") in the old town.

Cover photo
Verena Keller, Lucerne, 8 February 2010

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Content

Foreword

Dear friends and colleagues

We are pleased to welcome you to the 22nd Conference of the European Bird Census Council (EBCC) *called Bird Numbers 2022: "Beyond the Atlas: challenges and opportunities".* The conference is held from 4 to 9 April 2022 in Lucerne, Switzerland. It is organised by the Swiss Ornithological Institute in Sempach. The historic city of Lucerne, the venue – the Swiss Museum of Transport ("Verkehrshaus der Schweiz") next to Lake Lucerne – and the nearby mountains will provide a setting for an inspiring week full of interesting talks, workshops and posters.

EBCC conferences are held every three years, bringing together people involved in bird monitoring, research and conservation across Europe and beyond. One year after the publication of the European Breeding Bird Atlas 2 book and following the online version of the maps published at the beginning of 2022, there is a strong focus on topics following up on EBBA2, be it the use for conservation, research, national atlases and monitoring programmes.

For two years the Covid-19 pandemic did not allow to have international conferences with physical presence. Enabling the EBCC network to meet face-to-face in Lucerne is therefore especially valuable. Around 250 participants will be present, coming from 47 different countries. Sadly, we will miss the participants from Ukraine, Russia and Belarus due to the military attack of the Russian Federation on Ukraine. We will hopefully be able to show some of their talks as pre-recorded videos, and we have kept all abstracts of participants who had to cancel their attendance. Birds do not know borders, and their research and conservation require international cooperation. Within EBCC projects, we work together with individuals and organisations across the whole of Europe towards common goals. Regardless of differences in language, culture, religion, or political views, the EBCC network has always shown a sense of cooperation and solidarity. The success of the EBCC projects – European Breeding Bird Atlases, EuroBirdPortal or Pan-European Common Bird Monitoring Scheme – is based on goodwill, cooperation, and tolerance. Unfortunately, these values have been put under severe threat by the aggression of the Russian Federation against Ukraine. While EBCC is a non-political organisation, it can work effectively only in conditions of an open and democratic society.

We acknowledge the contribution of all our partners and sponsors. Without their support this Conference would be unconceivable. We are also grateful to all the helpers and volunteers, who will do their best to make your stay among us pleasant and memorable.

We are sure that this will be another successful and inspiring EBCC conference. Have a very enjoyable and fruitful week!

Mark Eaton, EBCC Chair; Jean-Yves Paquet, Chair of the Scientific Programme Committee

Peter Knaus, Thomas Sattler and Verena Keller, Local Organising Committee

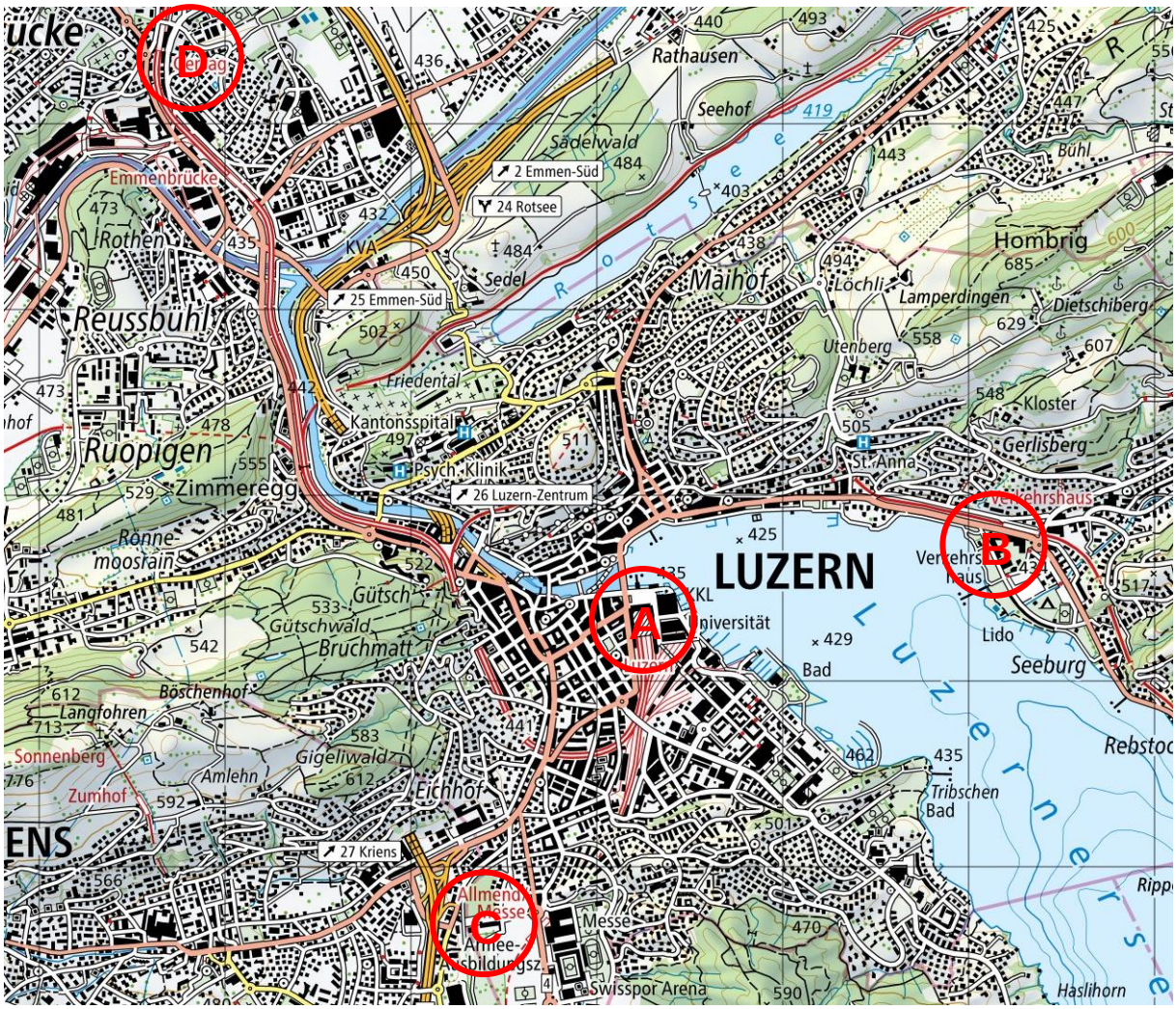
General Information

Conference location

The conference will be held at the Swiss Museum of Transport (“Verkehrshaus der Schweiz”) on the shore of Lake Lucerne.

Swiss Museum of Transport (“Verkehrshaus der Schweiz”), Lidostrasse 5, 6006 Lucerne, phone +41 41 375 75 75, www.verkehrshaus.ch/en

Map 1 Overview



Legend

A = Main railway station

B = Swiss Museum of Transport (“Verkehrshaus der Schweiz”), Lidostrasse 5, 6006 Lucerne, www.verkehrshaus.ch/en

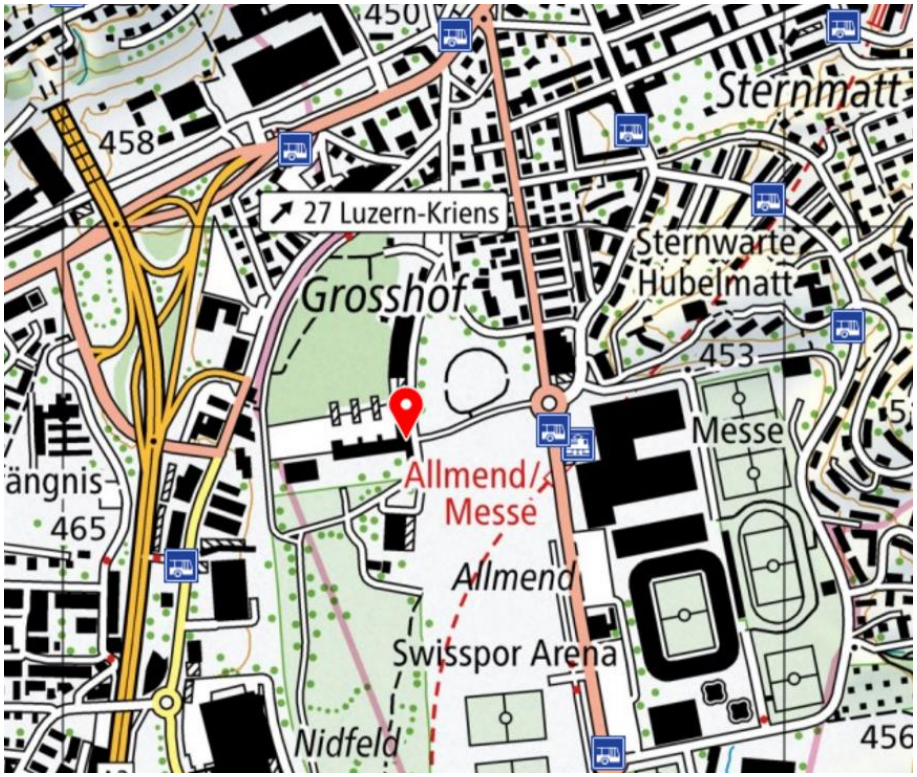
C = Low-price accommodation: Armee-Ausbildungszentrum Luzern (AAL), Murmattweg 6, 6000 Lucerne, www.aal.lu.ch

D = Conference dinner on Thursday: Le Théâtre, Rüeggisingerstrasse 20A, 6020 Emmenbrücke-Gersag, https://le-theatre.ch

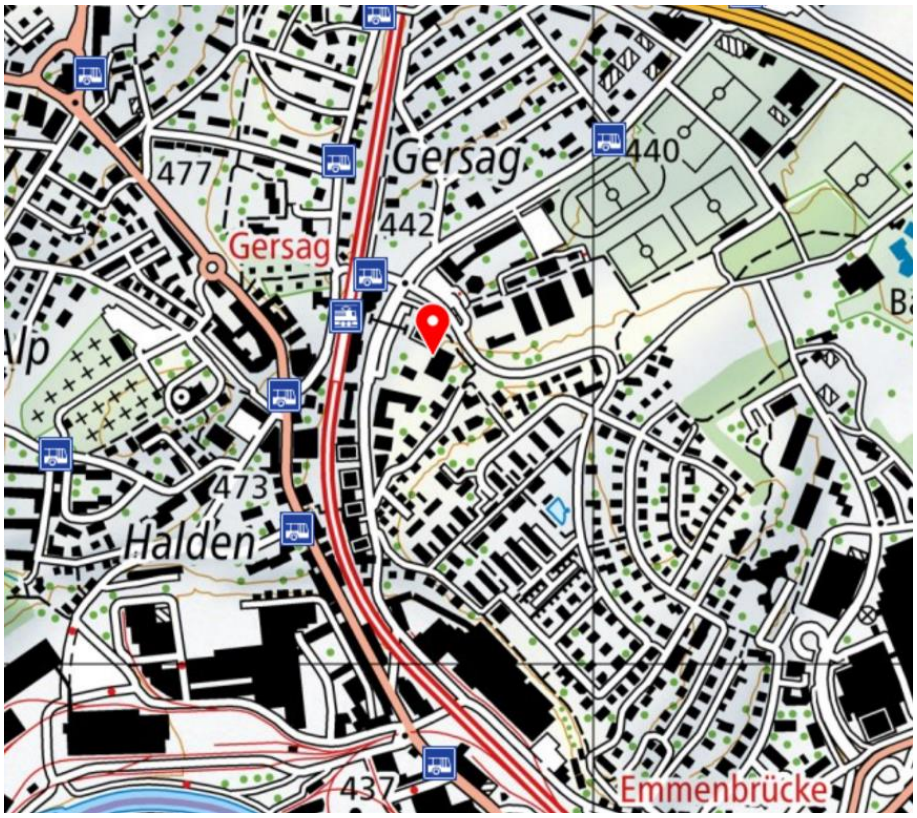
Map 2 Detailed maps

Swiss Museum of Transport (“Verkehrshaus der Schweiz”), Lidostrasse 5, 6006 Lucerne, www.verkehrshaus.ch/en; * = starting point for the excursions (Lido car park)

Armee-Ausbildungszentrum Luzern (AAL), Murmattweg 6,
6000 Lucerne, www.aal.lu.ch



Conference dinner on Thursday: Le Théâtre, Rüeggisingerstrasse 20A, 6020 Emmenbrücke-Gersag, https://le-theatre.ch



Map 3: Public transport (train and bus)

Conference office

The conference office is located in the Swiss Museum of Transport (“Verkehrshaus der Schweiz”) (see maps 1 and 2).

Opening hours:

Monday (4 April): 14:30–20:00

Tuesday (5 April): 08:00–20:00

Wednesday (6 April): 08:15–09:00 and later in the breaks and during lunch

Thursday (7 April): closed

Friday (8 April): 08:10–09:00 and later in the breaks and during lunch

Please check our website for latest news and changes: www.ebcc2022.ch. Or follow us on Twitter: https://twitter.com/ebcc2022. If you use social media yourself, please use the Twitter handle “@ebcc2022” and/or the conference hashtag “#ebcc2022”.

Conference office email: ebcc2022@vogelwarte.ch

Contact in urgent cases (4–9 April): +41 78 837 32 93 (Peter Knaus)

Please visit the conference office after your arrival at the conference venue to register and to receive your conference pack. Please make sure you have paid the conference fee before your arrival.

Internet access

During the conference free WiFi internet access will be available in the Swiss Museum of Transport for all conference participants

Welcome event

Before the conference starts on Tuesday, there will be a welcome event on Monday evening (17:00–20:00). A film about the diversity of Swiss birds will also be shown. If you are interested in meeting up with other conference participants, we look forward to welcoming you.

Breaks and lunch

During conference breaks drinks and snacks will be available in the foyer between the two lecture halls. On Tuesday, Wednesday and Friday, lunch will be served at the restaurant of the Swiss Museum of Transport (“Verkehrshaus der Schweiz”) on the ground floor. Lunch will be taken in two groups: group 1: 12:30–13:15, group 2: 13:15–14:00. The number of the group is indicated on the name tag. We ask everyone to keep to this arrangement and to leave their seats in a timely manner after lunch.

During the excursions scheduled for Thursday packed lunches and drinks will be provided. Catering and lunches are covered by the conference fee.

Excursions

The mid-conference excursions take place on Thursday, 7 April and will last generally the whole day. Departure: between 7:00 and 7:30 am (depending on the excursion) from the Lido car park close to the Swiss Museum of Transport ("Verkehrshaus der Schweiz") (see map 2). More information on the excursions is provided in this booklet. As short-term changes of excursion plans could be required please pay attention to related announcements or inform yourself at the conference office.

Conference dinner

On Thursday, 7 April and following the excursions on that day we invite you to join the conference dinner. Arrival of the participants from 18:45, the programme starts at 19:00. The location is: Le Théâtre, Rüeggisingerstrasse 20A, 6020 Emmenbrücke-Gersag, https://le-theatre.ch, only two minutes walk from the train stop "Emmenbrücke Gersag". The conference dinner is covered by your conference fee.

Train services from Lucerne main station to Emmenbrücke Gersag:

S9 direction Lenzburg: 18:32 (departure) – 18:39 (arrival)

S1 direction Sursee: 18:44 (departure) – 18:51 (arrival)

Pre- and post-conference meetings

The EBBC board meeting and the PECBMS workshop on Monday as well as the workshops on international waterbird monitoring on Saturday will also be held at the Swiss Museum of Transport ("Verkehrshaus der Schweiz") (see maps 1 and 2). Please consider separate announcements distributed by the responsible conveners.

Important notes for speakers

Speakers are required to provide their final presentation at the latest one day before they are scheduled (for presentations on Friday latest on Wednesday). Files must be sent by email to ebcc2022@vogelwarte.ch or be provided to the conference office on USB sticks. Private notebooks cannot be used. The projection systems in both halls can support 16:9 (widescreen) and 4:3 (standard) aspect ratios. Please prepare your final presentation in one of these two formats. The preferred file format is PPTX or PPT (Microsoft PowerPoint) or PDF.

Each speaker will have 15 minutes (12 minutes for the presentation and 3 minutes for questions). Plenary talks are longer (45 minutes, including discussion). We urge you to stick to the time allocated for your presentation. This will also be assured by the respective session chairs.

Important notes for poster exhibitors

Posters have to be printed and brought to the conference by the respective author. A provision in electronic form is not required. We refer to the poster specifications on the conference website which have to be followed. For your poster, a board and push pins will be provided. Posters should be mounted on Monday afternoon or evening or Tuesday morning in the conference hall and foyer before the start of the lecture programme; the location number is also given in this booklet. Poster authors are responsible

for removal of their posters, at the latest by Friday, 18:00. During the poster session at least one author should be available for questions.

Proceedings

The conference papers will be published in the conference proceedings (special English issue of the scientific journal “Ornithologischer Beobachter”), a peer-reviewed scientific journal published by the Ala, Swiss Society for the Study and Conservation of Birds.

Publication of proceedings is scheduled for December 2022. We would like to explicitly encourage all authors (including the poster authors) to submit their papers.

Please provide your manuscripts on time. Submission deadline for manuscripts is 1 May 2022.

Contact for authors: Peter Knaus, peter.knaus@vogelwarte.ch

Directions to Lucerne and local transport

Lucerne lies in the heart of Switzerland. Whether you arrive by bus, train, car or boat, Lucerne is well connected and easy to reach, and connections to airports and railway stations are quick, too.

… by train, bus and taxi

Regular, direct and convenient train services connect Lucerne to all the major Swiss urban centres as well as to key European cities. The main railway station in Lucerne is centrally located close to Lake Lucerne. Directly next to the station is the bus station providing numerous possibilities of travelling to other parts of the town.

Starting from the stop “Luzern Bahnhof” please use bus 6 (direction “Büttenenhalde”), bus 8 (direction “Würzenbach”) or bus 24 (direction “Tschädigen”) to reach the bus stop “Verkehrshaus” within 10 minutes. Alternatively, you can use the train from the main railway station: S3 train (direction “Brunnen”) or InterRegio “Voralpen-Express” (IR, direction “St. Gallen”) to reach the train stop “Luzern Verkehrshaus” within 8 minutes. In both cases the Swiss Museum of Transport (“Verkehrshaus der Schweiz”) is located right next door and can be reached with a short walk.

Single tickets (valid for 1 hour) cost 4.10 CHF or 4.10 Euro, day tickets 8.20 CHF or 8.20 Euro. Tickets must be purchased before starting your journey. If you stay in a hotel, the ticket for public transport is usually included (Visitor Card). Participants staying in the low-price accommodation (Armee-Ausbildungszentrum Luzern AAL) (see maps 1 and 2) will receive a ticket for the entire duration of the conference (4–9 April 2022) in advance. It is printed on the conference participation confirmation. You must carry the document with you at all times.

Taxis are available all around the clock at +41 41 310 10 10 or +41 41 440 40 40 or via Uber.

… by airplane

Zurich Airport is situated north of Zurich and Lucerne (approx. 70 km) and is connected by regular direct trains at one-hour intervals with a travel time of slightly over an hour.

Other airports – a bit further away – are: Euro-Airport Basel Mulhouse Freiburg (approx. 1 h 40 mins by train), Geneva Airport (3 hours) and Milano Malpensa (3.5 hours)

… by car

Lucerne can also be easily reached by car and has motorway connections to Zurich, Bern and Basel as well as the whole of Central Switzerland and the Bernese Oberland.

Parking cars requires a charge everywhere in the city centre of Lucerne (also outside of car parks and underground parking). The closest parking, “Lido” is located just opposite the Swiss Museum of Transport (“Verkehrshaus der Schweiz”) along Lidostrasse and opposite the lakeside lido. The Lido car park offers 800 parking spaces for short-term parking. You pay 2 CHF per hour and the maximum parking time is 12 hours. 8 short-term parking bays (2 hours), 4 disabled bays and 3 electric vehicle rapid charge points are provided in front of the museum.

The city of Lucerne

Lucerne is a city in central Switzerland, in the German-speaking part of the country. With a population of approximately 82,000 people, Lucerne is the biggest town in central Switzerland. The city’s urban area consists of 19 municipalities and towns with an overall population of about 220,000 inhabitants.

Owing to its location on the shores of Lake Lucerne (“Vierwaldstättersee”) and its outflow, the river Reuss, within sight of the mountains of Pilatus and Rigi in the Swiss Alps, Lucerne has long been a destination for tourists. One of the city’s famous landmarks is the Chapel Bridge (“Kapellbrücke”), a wooden bridge first erected in the 14th century. Lucerne ranks amongst the world’s prettiest cities and is rich in sights and attractions. Contributing to Lucerne’s cityscape alongside the world-famous Chapel Bridge (“Kapellbrücke”) and Water Tower (“Wasserturm”) are the Musegg Wall (“Museggmauer”, the Lion Monument (“Löwendenkmal”) and the KKL culture and convention centre (“Kultur- und Kongresszentrum Luzern”), among others. Lucerne is best discovered on foot.

There are several nature spots interesting for birding around Lucerne. The bay of Lake Lucerne in the city itself is a good site for flocks of Red-crested Pochard and other waterbirds. Some waterbirds regularly move between Lucerne and the close-by Rotsee, a natural rowing lake on the northern edge of Lucerne, where there is less disturbance in winter. The historical “Wasserturm” hosts a large breeding colony of Alpine Swifts, whereas Goosanders are nesting preferentially in the old town wall, the “Museggmauer”. Around Pilatus and Rigi some Alpine species can be seen, like Alpine Accentor or Yellow-billed Chough. Not far from Lucerne, the Wauwilermoos hosts a selection of marshland and meadow birds, among others the largest Swiss colony of Northern Lapwings.

Accommodation

Lucerne offers a wide range of accommodation in Hotels, B&B and Hostels, which can be booked directly by participants. There is also low-price accommodation for a limited number of participants.

Low-price accommodation

We can offer a special arrangement for accommodation at a low price for a limited number of participants. It can be reached by train from the main railway station (S4, S5, S41, S44, S55 trains) in 2 minutes or by bus 20 (direction “Horw”) in 7 minutes; in both cases the train and bus stop is called “Allmend/Messe”. The total travel time from/to the conference location at the Swiss Museum of Transport (“Verkehrshaus der Schweiz”) is around 20 minutes.

The location is: Armee-Ausbildungszentrum Luzern (AAL), Murmattweg 6, 6000 Lucerne, www.aal.lu.ch (see maps 1 and 2). It is an army training centre which has been transformed to a modern conference centre. Accommodation is offered in shared rooms, mostly with five beds (a few with four and three) and shared facilities. The accommodation is offered at a total price of 160 Euro for five nights, with arrival Monday, 4 April and departure Saturday, 9 April (until 10 am).

Tourist information

Luzern Tourismus AG, Tourist Information, Railway station (platform 3), Zentralstrasse 5, 6002 Lucerne, +41 41 227 17 17, luzern@luzern.com, www.luzern.com/en

Opening hours: Monday to Friday: 08:30–15:00, Weekends: 09:00–13:00

If you still require accommodation, you are welcome to contact the staff of the tourist information which will find a suitable room for you.

Emergency phone numbers

Police: 117

Emergency doctor: 118

Fire brigade: 144

Local Organising Committee: +41 78 837 32 93 (Peter Knaus)

Conference venue (background right). Photograph: Verena Keller

Programme Overview

The table below provides you with a quick overview of the conference week.

Monday, 4 April

Afternoon

– PECBMS workshop
– Arrivals
– Registration

Evening

– Welcome event, film

Tuesday, 5 April

Morning

– Registration
– Opening
– Plenary: Still small and beautiful: habitat and bird diversity in mountainous Switzerland
– Break
– Parallel sessions: Population estimates | Trends and indicators 1

Afternoon

– Plenary: Diversity matters
– Poster session
– Break
– Parallel sessions: Citizen science and capacity building 1 | Trends and indicators 2

Evening

– EBP workshop

Wednesday, 6 April

Morning

– Plenary: The European Butterfly Monitoring Scheme: a new perspective on Europe’s changing wildlife
– Parallel sessions: Citizen Science and capacity building 2 | Methods and analytical techniques 1
– Break
– Parallel sessions: Common Bird Monitoring | Methods and analytical techniques 2

Morning

– Parallel sessions: Bird distribution and atlas work 1 | Drivers of change 1
– Annual general meeting
– Break
– Parallel sessions: Bird distribution and atlas work 2 | Drivers of change 2

Evening

– EBBA2 workshop

Thursday, 7 April

Daytime

– Field excursions

Evening

– Conference dinner

Friday, 8 April

Morning

– Plenary: Changes in the ranges of breeding bird species in the European part of Russia during the last 20–30 years
– Parallel sessions: Population and distribution trends | Demographic monitoring
– Break
– Parallel sessions: Population monitoring 1 | Conservation 1

Afternoon

– Parallel sessions: Population monitoring 2 | Conservation 2
– Break
– Parallel sessions: Population monitoring 3 | Conservation 3
– Plenary: The European Breeding Bird Atlas project: more than a book
– Closing

Evening

– Roundtable African Bird Atlas Project (ABAP)

Saturday, 9 April

Morning

– IWC workshop

The city of Lucerne with the Chapel Bridge ("Kapellbrücke") and Water Tower ("Wasserturm") and in the background Mount Pilatus. Photograph: Jérôme Guélat

Programme

Monday, 4 April		
14:30	Conference office open | Main Hall	**Workshop:** Pan-European Common Bird Monitoring (PECBMS) | Seminar Hall
17:00	Welcome event, film | Main Hall	
20:00	Conference office closed	
Tuesday, 5 April		
08:00	Conference office open	
09:00	Opening | Main Hall MARK EATON, Chair, European Bird Census Council GILBERTO PASINELLI, Scientific Director, Swiss Ornithological Institute REINHARD SCHNIDRIG, Head of Wildlife Conservation Section, Federal Office for the Environment ADRIAN BORGULA, City Councillor Lucerne	
09:45	**Plenary** *Chair: Verena Keller* | Main Hall THOMAS SATTLER, MARC KÉRY – Still small and beautiful: habitat and bird diversity in mountainous Switzerland	
10:30	Break	
	Population estimates *Chair: Verena Keller* | Main Hall	**Trends and indicators 1** *Chair: Jean-Yves Paquet* | Seminar Hall
11:15	HERRANDO – Towards improved population estimates: comparing abundance data from the European Breeding Bird Atlas 2 with estimates from the European Red List of Birds	BURNS, GREGORY – Abundance decline in the avifauna of the European Union reveals cross-continental similarities in biodiversity change
11:30	STREBEL – Estimating nationwide breeding population sizes by combining multiple data sources and analytical approaches	O'REILLY – Exploring the functional diversity of avian communities in Europe
11:45	NABIAS – Estimating the population sizes for common breeding bird species in France by large-scale citizen-based monitoring (EPOC/EPOC-ODF)	POOT – How to bring the right message with multispecies indicators of biodiversity change
12:00	AUNINS – Population estimates of Latvian common birds from breeding bird survey data	PRINCÉ – From bird monitoring data to policy impact assessment: an integrated modelling approach to calculate the FBI in Agricultural Policy scenarios
12:15	NAGY – Towards improved population size estimates for wintering waterbirds	RAM – Birds and butterflies show different population trends: a cross-taxa and multi-scale comparison of biodiversity indicators
12:30	Lunch Group 1	
13:15	Lunch Group 2	

14:15	**Plenary** *Chair: Mark Eaton* | Main Hall JULIET VICKERY – Diversity matters	
15:00	Poster session	
16:15	Break	
	Citizen science and capacity building 1 *Chair: Mark Eaton* | Main Hall	**Trends and indicators 2** *Chair: Ainars Aunins* | Seminar Hall
16:45	GARGALLO – The EuroBirdPortal: current state of the project and its outputs	MUSIL – Changes in waterbird breeding populations as the result of changing feeding conditions in Czechia
17:00	CLIVAZ – Automated checks of erroneous data based on artificial intelligence	NUHLÍČKOVÁ – Bird population trends in the Slovak Republic in 2005–2020: a complex analysis from the past to the present status
17:15	SCHMID – Quantitative monitoring of migratory birds: novel perspectives using radar and citizen science	DAKKI, DEFOS DU RAU – A new statistical approach for increasing accuracy in estimating waterbird population trends
17:30	SIERDSEMA, MILANESI – Spatio-temporal models to estimate the dynamic distributions of European waterfowl	JOSEPH – Exploring links between migration phenology and breeding population trends in European birds
17:45	GODINHO – Traditional atlases are out of date? How online platforms can help when the resources available are scarce	HOCHACHKA – Detecting impacts of extreme environmental events on bird populations when observers' behaviours also change
18:00	Dinner (individual)	
20:00 21:45	**Workshop**: EuroBirdPortal: Launch of the new Migration Mapping Tool and overall overview of the EBP project and its future developments | Seminar Hall	
Wednesday, 6 April		
08:15	Conference office open	
09:00	**Plenary** *Chair: Dawn Balmer* | Main Hall MARTIN WARREN – The European Butterfly Monitoring Scheme: a new perspective on Europe's changing wildlife	
	Citizen Science and capacity building 2 *Chair: Dawn Balmer* | Main Hall	**Methods and analytical techniques 1** *Chair: Gabriel Gargallo* | Seminar Hall
10:00	MAYSON – Expanding non-avian taxa recording in BirdTrack and establishing links with iRecord for data sharing and verification	BELLEBAUM – Remote counting – demographic monitoring of a declining seaduck population
10:15	DOMȘA – The paradigm shift: using mobile apps and high-resolution satellite maps in bird monitoring	SICACHA-PARADA – A modelling framework for integrating Citizen Science data and professional surveys in ecology: A case study on bird mortality hotspots caused by powerlines
10:30	ESCANDELL – AVEFY y AVIZOR	HOLM – Use of UAVs and deep learning improves monitoring of breeding Herring Gulls
10:45	Break	

	Common Bird Monitoring *Chair: Danae Portolou* | Main Hall	**Methods and analytical techniques 2** *Chair: Aleksi Lehikonien* | Seminar Hall
11:30	VOŘÍŠEK – How to fill the geographical gaps in the coverage of Europe by generic bird monitoring schemes?	NATER – Beyond bespoke: standardized integrated population models reveal drivers of population dynamics of migratory birds across latitudes
11:45	MIRIĆ – International Census Plots – a path to the common bird monitoring in Serbia	KÉRY – The power of occupancy models for territory-based bird population studies: a mini-review
12:00	MORKOVIN – Common bird monitoring in the European part of Russia – first results and near-term prospects	MILANESI – What do we gain by increasing model complexity? A comparison among several SDM approaches tested for EBBA2
12:15	HRISTOV – State of common birds in Bulgaria 2021: Results from 17 years of common bird monitoring	
12:30	Lunch Group 1	
13:15	Lunch Group 2	
	Bird distribution and atlas work 1 *Chair: Danae Portolou* | Main Hall	**Drivers of change 1** *Chair: Henning Heldbjerg* | Seminar Hall
14:15	BAILLIE, ROBINSON – The Eurasian African Bird Migration Atlas – documenting migration and movements using ringing and tracking data	REIF – Population changes of forest birds in Czechia: decomposition of possible drivers
14:30	MARKONES – An offshore bird atlas for the German North Sea: distribution, numbers and trends of seabirds at sea	PAQUET – The rise and fall of coniferous forest birds in Belgium
14:45	GUÉLAT – Elevation shifts in the Swiss breeding bird community: teasing apart climatic and habitat effects on the distribution dynamics	FLADE – Population dynamics of many central European forest birds is driven by forest tree seed crop
15:00	MARJAKANGAS – Ecological barriers drive spatiotemporal shifts of bird communities	BASILE – Predator-prey systems with shared resources: woodpeckers, bark beetle, and deadwood
15:15	Annual general meeting	
16:15	Break	
	Bird distribution and atlas work 2 *Chair: Sergi Herrando* | Main Hall	**Drivers of change 2** *Chair: Lluis Brotons* | Seminar Hall
16:45	TEUFELBAUER – A first look at the results of the 2nd Austrian breeding bird atlas	GREGORY – Contrasting trends of widespread forest and farmland birds in Europe: an analysis of trends, uncertainty and species selection
17:00	FRANCH – The Catalan Breeding Bird Atlas – Distribution and abundance 2015–2018 and change since 1980	DAVIS – Potential drivers of Common Starling and House Sparrow abundance across two continents
17:15	MOLINA – Bird atlas in breeding season	BENKÖ – Exploring the effects of intensifying agriculture upon Romanian farmland bird communities
17:30	HALLMAN – Rapid shifts in the elevational distributions of Swiss birds and associated species traits	FRANK – Effects of compositional and configurational crop heterogeneity on farmland bird abundance and diversity

17:45	CARBONERAS, REQUENA – Applying EBBA2 distribution models to conservation: a practical example with European Turtle Dove	KMECL – Woodlark *Lullula arborea* habitat in mosaic agricultural landscape
18:00	Dinner (individual)	
20:00 21:45	**Workshop**: EBBA2: updates and new developments | Seminar Hall	
Friday, 8 April		
08:15	Conference office open	
09:00	**Plenary** *Chair: Petr Voříšek* | Main Hall MIKHAIL KALYAKIN – Changes in the ranges of breeding bird species in the European part of Russia during the last 20–30 years	
	Population and distribution trends *Chair: Petr Voříšek* | Main Hall	**Demographic monitoring** *Chair: Szabolcs Nagy* | Seminar Hall
10:00	KAMP – Harnessing hidden data treasures for bird population trend estimates in the Eurasian flyways	WAHL – Modular and mobile - the future of goose and swan monitoring in Germany
10:15	MUSILOVA – Diet and distribution changes as drivers of changes of wetland habitat use in waterbirds wintering in Czechia	KOFFIJBERG – Breeding success monitoring in arctic- and temperate-breeding goose and swan species
10:30	COUET– Short-lived species move uphill faster under climate change	VAN TURNHOUT – Involving citizens in demographic monitoring: the declining Dutch Mallard population as an example
10:45	Break	
	Population monitoring 1 *Chair: Petr Voříšek* | Main Hall	**Conservation 1** *Chair: Szabolcs Nagy* | Seminar Hall
11:30	LEHIKOINEN – Monitoring quantity and quality of bird feeding and factors affecting to the feeding	CHANTOUFI – Integrating biodiversity conservation issues in water management strategies: the consequences of dam development on the conservation of wintering waterbirds in the Mediterranean region
11:45	NOBLE – European Raptor Monitoring Facility – monitoring raptors for exposure to toxic substances and biological impact	POPOFF – Gaps in the Mediterranean Ramsar network
12:00	CLAUSEN – Dabbling ducks in Denmark 1965–2021: the ups and downs of half a century of monitoring their abundance in a changing waterscape	PETKOV – Climate Change and Challenges in Migratory Geese Status and Population Assessments – the case of the Red-breasted Goose
12:15		KUZMENKO – Bird research within the project “Polesia – wilderness without borders”
12:30	Lunch Group 1	
13:15	Lunch Group 2	

	Population monitoring 2 *Chair: Alena Klvaňová* | Main Hall	**Conservation 2** *Chair: Anna Staneva* | Seminar Hall
14:15	PERIS MORENTE – A new project to monitor forest-dwelling raptors in Catalonia. A methodological approach	PORTACCIO – The Natura 2000 network contribution to breeding bird trends at the regional level in relation to land cover type
14:30	MASSIMINO – Phenological mismatch between breeding birds and their surveyors. Do we need to worry (yet)?	HINTSANEN – Do protected areas work as "safe havens" for avian communities in a warming climate?
14:45	HARRIS – Impacts of COVID-19 restrictions on the UK's Breeding Bird Survey	GAGET – Conservation for improving bird responses to climate change
15:00	TRAUTMANN – German Common Breeding Bird Survey goes mobile and digital – lessons learned during the transition from a paper-only monitoring programme	BAKX – Areas of High Conservation Value support more specialist forest birds
15:15	KEIŠS – Monitoring of bird population changes by various monitoring schemes in Latvia – do the trends match?	CHODKIEWICZ – Changes in the numbers of common breeding birds within and outside protected areas in Poland
15:30	Break	
	Population monitoring 3 *Chair: Chris van Turnhout* | Main Hall	**Conservation 3** *Chair: Jean-Yves Paquet* | Seminar Hall
16:15	LÖRCHER – Spatial and temporal variations in the main causes of mortality in the Bearded Vulture: implications for the conservation of European populations	STANEVA – Updating the European Red List of Birds: results and lessons from the latest assessment
16:30	OPPEL – Monitoring the eastern Egyptian Vulture population by territory surveys and migration counts	KNAUS – Changes in threatened birds of Switzerland according to three Red Lists (2001, 2010 and 2021) using IUCN guidelines
16:45	KASSINIS – The Long-legged Buzzard *Buteo rufinus* in Cyprus: Three decades of presence and expansion on the island	ANTON – Living Planet Index for Catalonia: The role of monitoring data in the evaluation of the state of nature
17:15	**Plenary** *Chair: Mark Eaton* | Main Hall VERENA KELLER – The European Breeding Bird Atlas project: more than a book	
18:00	Closing	
18:15	Dinner (individual)	
20:00 21:45	**Roundtable**: The African Bird Atlas Project (ABAP) – European Ornithology's greatest need | Seminar Hall	
Saturday, 9 April		
09:00 11:45	**Workshop**: International Waterbird Census (IWC) | Seminar Hall	

Plenaries

Tuesday 5 April 2022

09:45–10:30 Conference Hall

Still small and beautiful: habitat and bird diversity in mountainous Switzerland

Thomas Sattler, Marc Kéry

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Here, in the conference's host country, patterns and trends in avifauna are marked by the broad altitudinal gradient of the Alps and the Jura mountains. Thanks in part to this gradient, Switzerland includes a large variety of habitats, which support a high diversity of birds. The Alps also support species such as Rock Ptarmigan and Three-toed Woodpecker that otherwise occur mainly in the boreal and tundra zones. Simultaneously, several mountain species such as Alpine Accentor, Wallcreeper and White-winged Snowfinch that primarily occur further south, also occur in the Swiss Alps. Switzerland has a strong international responsibility to protect these alpine species. While climate change affects avian distributions, trending towards upslope movement, for many subalpine and alpine species, populations currently remain relatively stable. Certain alpine specialists, such as Rock Ptarmigan and White-winged Snowfinch, however, have declined. As warming continues, populations of other species are predicted to decline, too. Beginning in the 1950s, intensive agriculture and the growth of urban areas in the Swiss lowlands, led to the decline and loss of many typical farmland species at low elevations. During the last 25 years, despite increasing ecological compensation payments, agricultural intensification has progressed to increasingly higher elevations and has caused additional declines of species that formerly used higher elevations as "refugia". Thanks to legislation established 150 years ago, forests are well protected in Switzerland. Many forest bird species thrive, as they benefit from the increasing forest area, volume and structural diversity. Raptor species deserve special attention in Switzerland. After dramatic losses caused primarily by hunting and pesticides, most species have recovered, and their populations continue to increase. In the context of the different aspects of this talk, we also present the role of the Swiss Ornithological Institute and its volunteers to monitor, study and conserve birds.

14:15–15:00 Conference Hall

Diversity Matters

Juliet Vickery

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Diversity and inclusion are widely recognised as essential elements of a successful business. A diverse and inclusive workforce brings to the table different backgrounds, skills, experiences and knowledge and, in doing so, leads to more innovation and creativity, better problem solving and higher productivity. In short, many of the features that ornithological science and conservation organisations also require to thrive and remain relevant to a society today.

Despite wide recognition of the need for and value of increasing all elements of diversity, many sectors are struggling to effect and implement change. The ornithological community is one such example where a lack of diversity is evident among professionals and volunteers on which work like that of EBCC depends. Drawing on experience mainly from the not for profit sector, including environmental charities and learned societies, I consider (i) the facts and figures in relation to where we are now (ii) the different barriers to participation in citizen science, ornithology and conservation in relation to those elements of diversity for which this is best researched and (iii) approaches to improve this illustrated with 'real life' examples. My hope is that this will raise awareness of and inform action towards a more co-ordinated

and concerted action to encourage participation in ornithology regardless of a person's nationality, gender, ethnicity, disability, sexuality and socio-economic status.

Wednesday 6 April 2022

09:00–09:45 Conference Hall

The European Butterfly Monitoring Scheme: a new perspective on Europe's changing wildlife

Martin Warren

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In order to understand changes in European biodiversity it is important to develop a range of indicators that reflect a broad diversity of organisms. Butterflies are good candidate indicators because they are relatively easy to identify and monitor, react quickly to environmental change, are popular with the public, and represent insects that comprise over half of terrestrial species (excluding micro-organisms). They provide a valuable complimentary set of indicators to birds.

Over the last few years, Butterfly Conservation Europe has developed the European Butterfly Monitoring Scheme (eBMS) in association with the UK Centre for Ecology and Hydrology. It now covers 22 countries, each of which monitors butterflies using standard protocols, either fixed transects that are walked regularly (often weekly) through the season, or by timed counts.

The data was brought together for the first time under the EU funded ABLE project (Assessing ButterfLies in Europe). This added 8 new countries to the scheme and the production of draft indicators on widespread butterflies as well as indicators for grassland, woodland, and urban areas. These are now being developed under the SPRING project (Strengthening Pollinator Recovery through INdicators and monitoring).

Butterflies underwent a massive decline in many countries during the twentieth century. The eBMS provides a new, Europe-wide baseline from which to measure change in the coming century. The talk will explain how this new scheme will help us understand the complexity of change occurring insects, as well as the impact of conservation measures such as the new EU Pollinator Initiative.

Friday 8 April 2022

09:00–09:45 Conference Hall

Changes in the ranges of breeding bird species in the European part of Russia during the last 20–30 years

Mikhail Kalyakin[1,5], Olga Voltzit[1], Petr Voříšek[2,5], Sergi Herrando[3,5], Verena Keller[4,5]

[1]Lomonosov Moscow State University, Russian Federation; [2]Czech Society for Ornithology, Czech Republic; [3]Catalan Ornithological Institute, Spain; [4]Swiss Ornithological Institute, Switzerland; [5]European Bird Census Council (EBCC); kalyakin@zmmu.msu.ru

The European Breeding Bird Atlas 2 (EBBA2) documented changes in breeding distribution in Europe, but due to the lack of data in EBBA1 the change could not be quantified for European Russia. However,

information about the changes in distribution is available in texts of species accounts in the Atlas of Breeding Birds of European Russia, although some information is based on local studies or expert knowledge. Based on the qualitative results of analyses performed by the authors of species accounts in Russian Atlas, we can assess the overall dynamics of bird ranges in European Russia.

119 species were identified for which changes in their ranges were detected over the past 30 years. 93 species expanded their range, whereas ranges of 22 species have contracted. In 66 species with an increased range, its northern border shifted to the N, in 20 species the southern border moved to the S. In 17 species, the range expanded to the E, in 11 species to the W. In most species showing a range contraction (10) the change was due to the shift of the southern border to the N. In eight species the northern border of the range shifted to the S, in three species the range decreased both in the northern and southern parts. A contraction in the E was observed for one species, in the W for four species. The range of four species shifted to the N: the northern and southern borders moved in a northerly direction. Despite range changes to the N dominate, changes in other directions occur as well and make the overall picture diverse. The results are also compared with those presented in EBBA2 for the more western parts of Europe.

[cancelled]

Land-use changes in Eastern Europe and their impact on the populations of farmland birds

Alexander Mischenko

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Eastern European countries are considered a stronghold for the continent's farmland bird diversity and numbers. At the end of the 20th century, member states of the EU experienced serious population declines of farmland birds due to agricultural intensification, which was not observed in the Eastern European non-member states. A number of papers indicate that entering EU's Common Agricultural Policy caused significant deterioration of farmland biodiversity. Therefore, we focused on non-member countries, in which the situation has not been seriously considered before. Collapse of agriculture started in these countries (except Belarus) in the 1990s and progressed till the mid-2000s, resulting in vast areas of abandoned farmland. Some growth in farming began around 2005, but the main agricultural indicators have not yet reached pre-crisis values. The reduction of cattle numbers still continues in Russia and Ukraine. Considerable polarization in farmland use has developed in European Russia, with extensive abandoned lands and small cattle numbers in the forest regions, and increasingly intensively cultivated arable lands in the forest-steppe and steppe regions. In the abandoned farmlands of Eastern European countries, the most negative trends take place in ground-nesting bird species for which short-grass habitats are optimal thanks to cattle grazing and haymaking: Northern Lapwing *Vanellus vanellus*, Black-tailed Godwit *Limosa limosa*, Common Redshank *Tringa totanus*, Skylark *Alauda arvensis* and Yellow Wagtail *Motacilla flava*. The population of Great Bustard *Otis tarda* in European Russia grew somewhat in the 1990s due to the decline in agriculture, but it decreased very much later due to ploughing of long-term fallows and intensive use of pesticides. Black-tailed Godwit is redistributed within the range in Russia: disappears on abandoned pastures and moves to used grasslands, arable lands and peat bogs. Due to this, its number in Russia has not decreased much, unlike in Poland and Ukraine, where diversity of habitats is much lower.

17:15–18:00 Conference Hall

The European Breeding Bird Atlas project: more than a book

Verena Keller[1,2]

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The publication of the second European Breeding Bird Atlas (EBBA2) book in 2020 and the launch of the interactive online version in February 2022 mark the end of a project that was launched in 2010. While the scientific results of EBBA2 are well visible in the published products, other aspects of the project remain hidden behind impressive figures such as the estimate of 120,000 fieldworkers. European diversity is not just visible in distribution maps of birds but is also reflected in the human network of contributors. Partners from almost 50 countries collaborated in the project. Bringing together the different experiences and capacities was a challenge but also an opportunity.

Looking back over the project period is one part, looking ahead is even more important. What can we learn from the EBBA2 project? Which opportunities and challenges lie ahead for the EBCC network? EBBA2 and the other EBCC projects are important projects by themselves while at the same time providing essential knowledge for conservation and high-quality data for scientific research. Whereas the value of the data is recognised by users, the amount of work behind the data is often underestimated. This is reflected by the difficulty to find adequate funding for monitoring and atlas projects.

Oral contributions

Tuesday 5 April 2022

11:15–12:30 Conference Hall

Population estimates

Towards improved population estimates: comparing abundance data from the European Breeding Bird Atlas 2 with estimates from the European Red List of Birds

Sergi Herrando[1,6,7], Petr Voříšek[2,6], Verena Keller[3,6], Lluís Brotons[1,4,7], Anna Staneva[5], Ian Burfield[5]

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Knowing the population size of birds is key for assessing their conservation status. In Europe, estimates of population sizes are an important part of the legal reporting under Art. 12 of the EU Birds Directive, and are also used in updates of the European Red List of Birds (ERLoB) and the identification of Key Biodiversity Areas (KBAs). They are also used in global and national Red Lists, by AEWA to calculate the size of waterbird flyway populations, and by PECBMS to weight national contributions of country data accordingly when producing multinational species population trend indices. However, estimating population sizes is not easy, and the complexity of bird monitoring and capacities to analyse existing data vary widely among countries and regions. As a result, differences in estimates between countries could be associated, at least partly, with these difficulties, rather than reflecting real biogeographic patterns and variations in bird abundance. The latest population estimates, compiled by BirdLife International as part of the 2019–2021 ERLoB update, are based on data reported by EU Member States and provided by national experts for the period 2013–2018. Roughly in the same period, the European Breeding Bird Atlas 2 (EBBA2) collected information on the number of breeding birds per atlas square (50 × 50 km) using logarithmic abundance classes. The data collected for both projects provide a unique opportunity to explore patterns in population size estimates across Europe. Describing emerging patterns from these data could help to identify gaps in knowledge that should be filled to improve future assessments of population sizes. Eventually, it may provide new good-practice guidelines to harmonise the methods used among countries and thereby help to improve population estimates at different scales.

Estimating nationwide breeding population sizes by combining multiple data sources and analytical approaches

Nicolas Strebel, Hans Schmid, Marc Kéry, Thomas Sattler, Jérôme Guélat, Peter Knaus

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'How many birds are there?' This is probably one of the most common questions in bird monitoring. However, answering this question for an entire region or even a country is usually not straightforward. As part of the Swiss Breeding Bird Atlas 2013–2016, we updated the national breeding population size estimates for all species. Very rare species and rare colonial breeders are typically well-observed, and thus we used complete enumerations based on annual compilations of all breeding records as breeding population estimates. For the other species, we applied interpolation methods of varying complexity, either based on data from the 2318 one-kilometre squares where territory mapping for the breeding bird atlas had been conducted, or based on all breeding period records from the entire country that were made during the years 2013 to 2016. In some cases, these data were subsequently combined with

regional population estimates. For most species, we considered the results of several different approaches to determine the final estimate, both ignoring and accounting for imperfect detection. This final species-by-species decision for the most appropriate approach was the main challenge. We think that the application of a rule-based selection approach alone might be dangerous. Therefore, we compared the outcome of different estimating approaches and involved species experts in an attempt to critically mirror population size estimates.

We estimated population sizes for a total of 210 species and 4 subspecies, which resulted in a total bird population estimate of annually more than ten million breeding pairs in Switzerland. The three most abundant species (Common Chaffinch, Eurasian Blackcap and Eurasian Blackbird), account for almost 25% of the Swiss bird populations. Eight of the ten most abundant species have forest as their main habitat.

Estimating the population sizes for common breeding bird species in France by large-scale citizen-based monitoring (EPOC/EPOC-ODF)

Jean Nabias[1,2], Romain Lorrillière[2], Jérémy Dupuy[1], Benoît Fontaine[2], Laurent Couzi[1], Luc Barbaro[2,3]

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In the framework of the European Union Birds Directive reporting, actual population sizes for common breeding bird species need to be assessed at the national level. In France, the LPO (Birds Protection League) in association with the MNHN (National Museum of Natural History) developed two citizen-based, online participatory schemes for this purpose, namely the EPOC (Common Birds' Population Estimate) and EPOC-ODF (Common Birds' Population Estimate – Birds of France).

The two monitoring schemes are based on 5 min point counts, during the breeding season (from March to June). Precise locations of all birds are recorded in order to measure the observation distance to infer species detectability for improved modelling of population size, habitat niche and distribution. In the EPOC scheme, observers are invited to select the location of the point count by themselves. In the EPOC-ODF scheme, the selected points to survey are randomly placed on a pre-existing systematic grid, and have to be visited at least three times during the breeding season, each visit consisting of three successive 5 min point counts considered as temporal replicates.

The data are a priori filtered to limit spatial or observer biases. Distance sampling and density surface modelling approaches are used to assess population sizes, while species distribution and habitat niche are modelled by Species Distribution Models (SDMs) using biomod2 R package.

To assess model robustness according to different bird species spatial distribution, habitat niche and population size, we compared models obtained for three species of birds with contrasting ranges, ecologies and life histories: Common Chaffinch *Fringilla coelebs*, Yellowhammer *Emberiza citrinella* and Sardinian Warbler *Sylvia melanocephala*, i.e., a generalist, a northern and a southern species, respectively. In general, for the three species, the predicted distributions fit anterior distribution estimated in prior atlases.

We collected an impressive amount of data through these monitoring programs in 2020, with nearly 59,000 individual 5 min point counts representing more than 650,000 abundance data for 411 breeding bird species. This should allow computing common breeding bird population size estimates at the French national level on a yearly basis.

Population estimates of Latvian common birds from breeding bird survey data

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Data from the Latvian common bird monitoring scheme and special standardised “atlas surveys” carried out during the fieldwork for EBBA2 was used to estimate the breeding population size for Latvian common birds. Both types of surveys were line transects replicated in space and time. The observed breeding birds were interpreted in pairs and allocated to an appropriate distance belt. Generalised distance sampling was used to estimate abundance while accounting for imperfect detection. A set of 34 environmental variables were used as correlates to explain recorded abundance, and variables describing survey conditions were used to model the detection and availability for detection. The best model for each species was used to predict species densities over a countrywide prediction grid. The sum of the predicted abundances per grid cell gave population estimates for the country.

Towards improved population size estimates for wintering waterbirds

Szabolcs Nagy[1], Teresa M. Frost[2], Gitte Høj Jensen[3], Nele Markones[4], Johan H. Mooij[5], Jean-Yves Paquet[6], Marie Suet[7]

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Often wintering population size estimates are based on simply adding up the counts from the International Waterbird Census. This approach implicitly assumes that the whole population has been censused, which is an invalid assumption for many species. Consequently, the population sizes of wintering waterbird populations both at the national and the flyway levels are underestimated. This has serious implications for population trend analyses, population status assessment, and for management of huntable species. To stimulate producing more reliable population size estimates, we provide a review of the existing methods and make some recommendations for their use in Europe.

11:15–12:30 Seminar Hall

Trends and indicators 1

Abundance decline in the avifauna of the European Union reveals cross-continental similarities in biodiversity change

Fiona Burns[1], Mark A Eaton[1], Ian J Burfield[2], Alena Klvaňová[3], Eva Šilarová[3], Anna Staneva[2], Richard D Gregory[1,4]

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While global assessments provide evidence of biodiversity decline, some have questioned the strength of the evidence, with local assemblage studies often showing a more balanced picture of biodiversity change. The multifaceted nature of biodiversity and imperfect monitoring datasets may partially explain these findings. Here, using an extensive dataset, we find significant biodiversity loss in the native avifauna of the European Union (EU). We estimate a decline of 17–19% in overall breeding bird abundance since 1980: a loss of 560–620 million individual birds. Both total and proportional declines in bird numbers are high amongst species associated with agricultural land. The distribution of species’ population

growth rates (ln) is centred close to zero with numerical decline driven by substantial losses in abundant species. Our work supports previous assessments indicating substantial recent biodiversity loss and calls to reduce the threat of extinctions and restore species' abundances, for the sake of nature and people.

Exploring the functional diversity of avian communities in Europe

Enya O'Reilly[1], Simon J. Butler[1], Richard D Gregory[2]

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Harmful human activity is continuing to have a negative impact on global biodiversity, with ongoing pressure threatening entire networks of species, their ecological strategies and functional roles. In recent decades, interest has grown in measuring the functional diversity of ecological communities, in order to better understand the impact humans have on them and on their functioning. Like many other regions of the world, Europe's biodiversity continues to be threatened by anthropogenic activity, and information regarding the functional diversity of ecological communities across European habitats at a large spatial scale remains sparse.

Using count data from the PECBMS, we aim to shed further light on this issue by exploring temporal and spatial trends in functional diversity metrics for avian communities across Europe for ten primary habitat types; deciduous forest, coniferous forest, mixed forest, agriculture, grassland, moors & heath, marsh & bog, scrub, urban and inland water. We explored functional diversity with regards to a range of avian species functional traits which contribute to supporting, regulatory and cultural ecosystem services. Overall, we found that functional diversity metrics varied between habitats and also varied spatially across European regions. Utilising the PECBMS data in this way will allow us to gain a greater insight into the impact humans have on this more intrinsic facet of biodiversity and will allow land-managers and policy-makers to tailor management decisions in a way that protects ecosystem functioning.

How to bring the right message with multispecies indicators of biodiversity change

Martin Poot[1], Chris van Turnhout[2], Richard Verweij[1], Jelle van Zweden[1], Dorine Jansen[1], Leo Soldaat[1], Tom van der Meij[1]

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A specific suite of biodiversity indicators, so-called multispecies indicators (MSIs) are widely used to describe changes in biodiversity. An MSI is essentially a geometric mean of the indexed population trends of a selection of species. However, the interplay between this geometric-mean method and the selection of species can influence the outcome considerably. Recent criticism on a prominent MSI, the Living Planet Index, focused on the inclusion or exclusion of species with extreme population trends dominating the result and thus the message it conveys.

The common approach towards selecting species for MSIs is to include habitat specialist species only: if these specialists are doing well, the habitat quality is good enough, and vice versa. Habitat specialism may be established by calculating and comparing the density of a species in different habitat types from observation data. This seems like an objective approach, but the resulting level of habitat specificity depends on the considered period, on the threshold value of the used metric and on the definition of the habitat type.

Selection criteria other than habitat specificity may also be considered, such as the rarity of a species, the accuracy of annual indices, or the sensitivity of the species to environmental factors. Furthermore, nature conservation motives may be used for selecting species, ranging from the protection status, the intrinsic value of species to ecosystem services.

With several example indicators, we explore the criteria for arriving at a more transparent method of species selection. For this, we developed a tool to test the influence of species with extreme trends on

the robustness of the resulting indicator. Instead of only using an MSI of habitat specialists, we advocate to use in addition multiple MSIs of ecological groups that include all species present. This provides a more extensive overview of changes in biodiversity.

From bird monitoring data to policy impact assessment: an integrated modelling approach to calculate the FBI in Agricultural Policy scenarios

Karine Princé[1], François Chiron[2], Ana Luisa Barbosa[3], Jesus Barreiro-Hurle[3], Thomas Fellmann[3], Iordan Hristov[3], Franz Weiss[4], Maria Luisa Paracchini[4]

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Over the last four decades, substantial declines have occurred in the range and abundance of animal and plant populations in Europe, which is mainly attributed to agricultural intensification. In line with the targets for nature restoration and conservation indicated by the EU Biodiversity and Farm to Fork Strategies for 2030, the common agricultural policy (CAP) has included in one of its key objectives the contribution to biodiversity protection, enhancement of ecosystem services and preservation of habitats and landscapes. The aim of this study is to develop an integrated robust methodology by embedding the Farmland Bird Indicator (FBI) into the agricultural economic model CAPRI. This methodological development may then be used to assess the impact of the CAP and other policies on conserving relatively common and widespread farmland birds. Using data from the Pan-European Breeding Bird Monitoring Scheme over the period 1990–2013, our analysis focuses on finding the relations between changes in farmland bird populations and changes in agricultural practices, within four macro-regions (Central & East Europe, North Europe, South Europe, West Europe). These relations are then linked to changes in agricultural production activities and common reporting indicators from CAPRI such as, crop shares, yields, nitrogen input, livestock density, resulting from policy change scenarios. Projections from the models are derived first to assess the predictive power of the model within each macro-region. We then use the projected species index from predicted abundances to calculate the FBI at NUTS2, macro-regional and EU scale. By testing the FBI performance in a scenario assessment exercise, it is possible to assess, for example, to which magnitude of changes the FBI is responding, and also what message the macro-level is providing compared to the regional level.

Birds and butterflies show different population trends: a cross-taxa and multi-scale comparison of biodiversity indicators

Dafne Ram[1], Karl-Olof Bergman[2], Paul Caplat[1,3], Erik Cronvall[4], Nicklas Jansson[5], Åke Lindström[1], Lars B. Pettersson[1]

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Biodiversity indicators are crucial in tracking progress toward biodiversity conservation goals and to be able to set relevant and effective goals for the future. Habitat based indicators are used to show the state of common species within a certain habitat and can ideally be used to evaluate or improve current management practices or policies. When using indicators to inform habitat-wide changes, one assumes that the indicator reflects the state of biodiversity or ecosystem health for that habitat, rather than only the selected species included in the indicator. But different taxa might respond differently to similar environmental drivers and it is therefore important to evaluate indicators against each other. To investigate how two well-established biodiversity indicators based on taxa with contrasting life histories respond across habitats and scales, we compared habitat-specific multi-species indicator trends of birds and butterflies nationally and regionally in Sweden. We calculated bird-based, as well as butterfly-based indicators for forest, farmland, grassland habitats, as well as indicators for common species. The study investigates to which extent indicators of birds and butterflies give a similar picture, or whether they rather should be seen as complimentary in indicating biodiversity status. We found that bird and butterfly

indicators showed different trends for comparable habitat-specific indicators both on national and regional scales. The variation on a regional scale also emphasizes the importance of regional analyses as a complement to the more traditional focus on national indicator trends.

16:45–18:00 Conference Hall

Citizen science and capacity building 1

The EuroBirdPortal: current state of the project and its outputs

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The EuroBirdPortal (EBP) project combines the data collected by the different online bird portals operating in Europe. These portals aim mainly to obtain year-round data from the relatively unstructured but intensive and widespread activities of birdwatchers, collecting vast amounts of data that offer great potential to better understand the temporal and spatial distribution of birds. All in all, the portals contributing to the EBP have collected more than 445 million bird records since 2010. In 2020 alone, 56 million bird records were collected and the annual figure keeps increasing by c. 14% year after year. Data is also increasing qualitatively. Currently, 34% of the whole EBP comes from complete or fixed lists and, overall, the submission of lists is increasing by c. 13% each year. On the other hand, more and more portals collect standard monitoring data (e.g. breeding bird surveys) or use specific data collection protocols (e.g. nocturnal flight calls) and submit such data to the EBP correctly identified and characterized making full use of the capabilities of the EBP data standard. The availability of the data collected in near real-time is one of the main added values of the EBP project. Currently, 17 out of the 20 online systems, accounting for 99.5% of all the data collected, submit data to the EBP automatically, on a daily basis and updated up to the previous day. The EBP provides information on the patterns of bird distribution (historic and real-time) for a selection of 137 bird species through the EBP viewer (www.eurobirdportal.org). Moreover, by combining its data with other continent-wide datasets (e.g. bird ringing data from EURING) the EBP is giving further applied value to the data collected by the online bird portals in such important areas as the surveillance of avian-borne diseases.

Automated checks of erroneous data based on artificial intelligence

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“Artificial intelligence is a rapidly evolving field. It can be of great help to identify erroneous data before they enter a database.”

Motivation

Up to 265,000 sightings a day are entered by observers in the ornithon webportals. Misidentification of birds do occur and misentries happen. The filtering of erroneous data is paramount in order to insure the quality and integrity of the Biolovision database which contains approximately 300 million records.

Problem statement

Until now, an automated data screening process enabled to detect e.g. temporal or spatial outliers, which are then forwarded to a reviewer volunteer network of thousands experienced ornithologists on a daily basis. Based on their human assessment, the data is either validated or sent back to the observer with a request for correction or additional information.

However, static filters only guarantee a basic check and cannot take into account special cases like influxes or occurrence in huge numbers at traditional roosting sites. In addition, the increase in the number of daily entries and the scarcity in human resources devoted to the review, requires an improvement of the automated data screening process.

Purpose

Static frequency threshold checks need to be replaced by multivariate models taking into consideration a whole range of predictor variables.

Study design

A spatial predictive model enables to calculate the probabilities of sightings of a species, on a specific day, at a specific place. Given the fact that high predictive power and not explanation is sought for, artificial intelligence is particularly well suited for this task.

Prediction and results

The work is actually ongoing and challenges are being addressed, such as the amount of data to be processed, the multiplicity of models to be run, cross-validation procedures, etc.

Conclusion

The presentation of our research will be informative to the audience, as it connects many actual research topics, such as big data, artificial intelligence and spatial predictive analysis.

Quantitative monitoring of migratory birds: novel perspectives using radar and citizen science

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Radar networks can provide continuous and long-term monitoring of migratory bird populations. Yearly trends of the population size of all migratory birds, as well as macro-demographic indices for reproduction and mortality, can be extracted from multi-year radar monitoring of migratory fluxes. In Western Europe, we find that 243 million more birds resided in the study area in summer 2018 than in the preceding winter. In autumn, 544 million more birds departed from Western Europe, giving a rough estimate of the recruitment rate of migratory birds that breed in the study domain and leave for the winter.

A central drawback of radar monitoring is the lack of knowledge on the species identity, information that is necessary for refining the retrieved macro-demographic indices to functional groups. The low taxonomic resolution of radar monitoring can be increased by combining it with ground observations from citizen platforms. For instance, we unmixed the wingbeat frequency information retrieved from radars to the expected wingbeat frequency of species observed on the ground. This and other sources of information may allow to refine the taxonomic resolution of radar monitoring. Ultimately, the combination

of radar technologies and citizen observations can provide a real-time monitoring of migratory birds for small groups of species. This will allow to target conservation actions during migration.

Spatio-temporal models to estimate the dynamic distributions of European waterfowl

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Migration of wild birds, particularly waterfowl, constitutes one mechanism by which Avian influenza (AI) is spread geographically. Good quantitative measures of the seasonal distribution of waterfowl can be useful in predicting the potential spread of AI outbreaks. Here we present European-scale modelling results for five species of duck, five species of goose, and two species of swan, using data collected by the EuroBirdPortal (EBP) project. These quantitative analyses complement a new online migration mapping tool developed jointly by EURING and EBP for the European Food and Safety Authority, which provides visualizations of the distribution and movement of 50 bird species relevant to the control of AI.

Modelling with EBP data requires robust procedures at different steps of the process to provide accurate maps of species distributions, while taking into account several factors related to data collection and structure. Specifically, given that, currently, only one-third of the EBP data provides non-detection information (data collected as complete lists), novel ways to make use of the whole dataset needed to be developed.

We modelled the distributions of bird species using presence/absence information, environmental predictors (similar to those used for the Second European Atlas, EBBA2), and proxies of sampling effort, while including spatio-temporal autocorrelation in patterns of species records. Our approach is the result of an intensive project comparing the accuracy of estimates from Spatio-Temporal Exploratory Models (STEM) and Integrated Nested Laplace Approximation (INLA) spatio-temporal models in predicting dynamic bird distributions.

We believe that our approach could be useful, not only in the context of AI monitoring, but to develop dynamic spatio-temporal bird distribution models in general. We discuss our findings, the limitations encountered, and the potential for future developments.

Traditional atlases are out of date? How online platforms can help when the resources available are scarce

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Time has changed, online portals for biodiversity, and for birds in particular, are widespread and responsible for collecting millions of records annually around the world. This has multiple implications on the data availability and quality. On one side we have huge up-to-date datasets to be analysed, but on the other side, concerns about data quality and data standardization are common. Can part of this data be used to improve atlas design and make the most of the few resources available? Are the future atlases ongoing works that only need censuses in low surveyed areas from time to time? To evaluate the potential of eBird data to plan a wintering atlas for Continental Portugal we analysed eight years of data (2013–2020 winters), focusing on the coverage of the country at ETRS 10 × 10 km, using as minimal sampling effort ten complete checklists and at least 3 h of census (identical to the first national wintering atlas). From the c. 1,000 squares 946 had at least one checklist for this period and 465 (~49%) had

records in 6 years provided by 1,666 different observers. Additionally, 685 squares (~68%) had more than 3 h of surveys; by overlapping these maps we were able to identify not only low coverage areas (e.g. south west part of the country, the mountain areas) but also specific squares. These results, together with the number of species detected by square, and compared with the results of the first wintering atlas (2011–2012) provide a useful tool to efficiently plan future atlas.

16:45–18:00 Seminar Hall

Trends and indicators 2

Changes in waterbird breeding populations as the result of changing feeding conditions in Czechia

Petr Musil, Zuzana Musilová, Jan Zouhar, Monika Homolková, Dorota Gajdošová, Šárka Neužilová

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The large-scale changes in waterbird populations have been documented since the end of the 19th century well reflected the trophic level of fishponds, the most important waterbird breeding habitat in Czech landscape. A decrease in breeding numbers was recorded in 18 of 27 waterbird species using data from 293 fishponds monitored in Czechia in 1981–2021. On the contrary, increasing numbers were confirmed only in seven species. The diet was found as the dominant driver of change in numbers of individual species. The numbers of all invertivores and four of five omnivores were decreasing. Regardless, increase in numbers was found among all herbivores and more than half of piscivores. The decrease in breeding numbers even nearly led to local extinctions (e.g. Black-necked Grebe, Eurasian Teal, Garganey, Shoveler, Black-headed Gull). It should be pointed out that more than 75% in total numbers of breeding waterbirds were lost in Czechia between 1981 and 2021 likely as a result of intensive fishpond management.

More recently (2004–2021), male-skewed changes in duck populations were found. The numbers of males began to increase in contrast with decreasing or stable numbers of females in four of six duck species (Mallard, Gadwall, Red-crested Pochard and Common Pochard). Furthermore, negative correlation between numbers of females at the beginning of the breeding season and numbers of broods per female was found in four of six duck species (Mallard, Red-crested pochard, Common Pochard, Common Goldeneye). The productivity seems to be limited by (1) availability of suitable invertebrate food for ducklings which is affected by high density of Carp stocks and (2) loss and degradation of breeding habitats (flooded littoral vegetation, fishpond islands).

Acquiring information regarding changes in breeding numbers as well as population structure and productivity is crucial for effective conservation measures.

Bird population trends in the Slovak Republic in 2005–2020: a complex analysis from the past to the present status

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In this study, population trends of a total of 129 birds were analysed using data of the Common Bird Census in Slovakia, which is part of PECBMS. We found that more than half of all bird species analysed (52%) indicated a reliable trend estimate. The greatest share of all species analysed had a stable population trend (28%), indicating almost no change in bird numbers across the study period. Regarding the species with increasing or decreasing trends, 10% and 9% of all species revealed a moderate

decline or increase, respectively. However, a steep decline in bird numbers has been found in six species (5%). Species with moderate increasing trends dominated among forest or hole-nesting birds. In contrast, the majority of birds with moderate decline were among open-nesters, typical in farmland, human settlements or ecotones. However, birds with steep declines represented species with different life-history strategies, including long-distant migrants such as Common Grasshopper Warbler and Whinchat or Spotted Nutcracker, a specialist breeding in mountain spruce forests, the state of which deteriorated due to higher rate of logging. Finally, we discussed obtained results in terms of regional as well as European levels. This study could provide an important contribution to the understanding of bird population dynamics especially in terms of Central Europe, with emphasis on Slovak conditions and in relation to changes in Slovak farmland or forests.

A new statistical approach for increasing accuracy in estimating waterbird population trends

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In biodiversity monitoring, large datasets from citizen-science programs are becoming more and more widely available and are increasingly used globally to estimate species trends and conservation status. These large-scale datasets and the subsequent data collection issues challenge existing statistical analysis methods, many of which are not adapted to their size, incompleteness and heterogeneity. The development of scalable methods to impute missing data in incomplete large-scale monitoring datasets is crucial to balance sampling in time or space and thus better inform conservation policies.

We developed a new method based on penalized Poisson models to impute and analyse incomplete monitoring data in a large-scale framework. The method allows parameterization of space and time factors, the main effects of predictor covariates, as well as space–time interactions. It also benefits from robust statistical and computational capability in large-scale settings.

We tested the method on both simulated and real-life waterbird counts, investigating the robustness of the method from 20% to 80% of missing data. Based on relative root mean square error evaluation, the method outperformed six other existing imputation methods, including TRIM. As a case study, we assessed the long-term trends of 16 waterbird species monitored by the Mediterranean Waterbirds Network at the entire North African scale, a region where monitoring data suffer from many gaps in space and time series.

This new approach opens promising perspectives to increase the accuracy of species-abundance trend estimations. It may also question the generic use of TRIM to assess waterbird population trends when several predictors are available. We made the method freely available in the r package 'lori' and recommend its use for large-scale count data, particularly in citizen science monitoring programmes.

Exploring links between migration phenology and breeding population trends in European birds

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With a long-standing tradition of monitoring their breeding abundance across Europe, birds are a valuable group for climate change impact assessments. Migratory birds appear to be particularly sensitive to climate change, with marked phenological shifts having been recorded.

In this study, we aimed to determine whether there was a link between the timing of prenuptial migration and the abundance of migratory bird populations in Europe. Our underlying hypothesis was that intraspecific flexibility in the timing of migration could make some species more resilient to extreme weather events than others. To explore this question, we used data from two citizen science programmes coordinated by the European Bird Census Council (EBCC): the Pan European Common Bird Monitoring Scheme (PECBMS) and EuroBirdPortal (EBP). Using a multi-model inferential approach including a range of factors, we examined the link between migration dynamics and population trends at the European scale, estimated over the long term (since 1980s) and over a more recent 10-year period (2008–2017).

We found differences between fully migratory species (for which all populations are composed of migratory individuals) and partially migratory species (for which sedentary and migratory individuals coexist within breeding populations). More precisely, we showed that fully migratory species that spread out their arrival on the breeding grounds over a long period of time are declining less than those whose return is concentrated within a short period. An opposite relationship was found in partial migrants. We argue that this observed link between migration timing and population dynamics in full and partial migrants could be a consequence of changing climatic conditions in Europe. Further analyses are now required to extend this work to a larger sample of species.

Detecting impacts of extreme environmental events on bird populations when observers' behaviours also change

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Volunteer-collected data are often used to describe species' distributions and long-term trends in population size. Changes in abundances of species can also be rapid, caused by weather extremes and other extreme events. Increased frequencies of such extreme events are projected to be one consequence of ongoing climate change, making the quantification of impacts of such extremes desirable. However, the process of quantifying such changes in bird abundances may be confounded by simultaneous changes in the way volunteers collect data. This is especially true when the data-collection process is unstructured, with observers choosing locations, times, or the amount of effort to expend. In our presentation, we will use the example of a heatwave in western North America in the summer of 2021 to: (1) illustrate how behaviour of observers can change rapidly and in ways that can affect the reported counts of bird species, (2) describe the use of analytical methods for separating variation in the observation process from changes in the abundances of birds, and (3) explore the use of a simulation-based approach for assessing the reliability of conclusions regarding changes in abundance.

Wednesday 6 April 2022

10:00–10:45 Conference Hall

Citizen Science and capacity building 2

Expanding non-avian taxa recording in BirdTrack and establishing links with iRecord for data sharing and verification

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BirdTrack is a long-standing multi partnership citizen science style survey run by the BTO that provides birdwatchers with a system to add their bird sightings. With the growing interest amongst birdwatchers in other taxa besides birds, this year BirdTrack added four other taxa groups (butterflies, reptiles, amphibians, and orchids) to its list of taxa groups that could be entered. Although both mammals and Odonata were already available within the project the addition of these other taxa groups raised some questions that were not unique to BirdTrack.

We carefully considered which taxa to include in BirdTrack and we considered how best to collect information on the way data were collected (structured vs unstructured).

An important aspect of collecting information on additional taxa is the onward flow of data to the existing organisations working on these taxa. This talk will focus on how we worked with organisations, verifiers, and recorders to achieve an efficient flow of data, ensuring that records are verified by skilled volunteers and these data available for conservation and science. Working with iRecord we established an automated link to facilitate the daily flow of non-avian taxa records from BirdTrack into iRecord and for avian records in iRecord to flow to BirdTrack so that records can be verified by the relevant verifiers.

The paradigm shift: using mobile apps and high-resolution satellite maps in bird monitoring

Cristian Domșa, Zoltán Benkő, Ciprian Fântână, Judit Veres-Szászka

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New technologies emerge every day and, if proven useful, their application in biodiversity monitoring will shortly become a norm. With them come also new challenges, often not clearly seen in the beginning. One of the current developments is the usage of mobile apps for collecting better and more accurate data.

Starting with 2020, the Common Bird Monitoring in Romania faced such a shift. We gradually made the transition from printed field forms to a mobile app. A special mobile app – Ornitodata – was developed for data collecting. The point count scheme was incorporated into the mobile app, and the birds' location is now marked in the field using a high-resolution satellite map (provided by Google). This approach allows us to place the observation at the exact location, while also registering the observer's position.

Having a much more precise distance between the birds and the observer gives us a new insight into data modelling (mainly for bird population trends, but also for bird species density). As all changes in any protocol of data collection methodology, this also poses the challenge of dealing with a shift in data structure. The main purpose of the data from our Common Bird Monitoring program is to calculate trends, and since the old approach of estimating the distance based on distance bands is extremely dependent on the observers' experience, the new, more precise, distance calculation shows a different picture of the distribution of the observations around the monitoring points. Reconciling these two approaches is a challenging task to look forward to.

AVEFY y AVIZOR

Virginia Escandell, Blas Molina, Juan Carlos del Moral

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Sampling of bird populations, whether for atlases, censuses or monitoring programs, requires an adequate methodology and its correct application. For this, it is necessary that the people who do it have a good training both for the identification of the species and to estimate the number of individuals.

In order to improve the skills of census takers, SEO/BirdLife has created two training tools: the AVEFY and AVIZOR mobile applications.

AVEFY allows training for the identification of birds by song. In this app the songs of more than 120 species of common birds in different habitats are reproduced to be able to carry out virtual censuses that evaluate the degree of successes and failures and allow each player to know their skill. Practice will allow them to identify birds by their song that maybe they did not recognize until that moment and improve their level of identification skill. It also allows players to practice with species with very similar songs, challenge other people, and compete in different game modes.

Another very important aspect in carrying out bird monitoring, especially when they are in large groups, is estimating the number of individuals. For this, the AVIZOR application facilitates training in the counting of individuals in different environments: aquatic, cut, trees or nests depending on the species.

These applications are available to be downloaded for free in the Android and iOS stores.

10:00–10:45 Seminar Hall

Methods and analytical techniques 1

Remote counting – demographic monitoring of a declining seaduck population

Jochen Bellebaum[1], Pius Korner[2], Kjell Larsson[3], Nele Markones[4]

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Demographic monitoring of Arctic breeding birds in their more accessible non-breeding grounds has a long tradition. Seaducks like the Long-tailed Duck *Clangula hyemalis* form an exception as they move between the tundra and off-shore wintering sites, making monitoring difficult at any time of the year.

We developed a field method to record age and sex composition of Long-tailed Duck flocks in their marine wintering areas. We combined the data obtained with records from other sources in a multi-step approach including error propagation, to estimate annual breeding success at the population level, taking into account the seasonal and spatial variation in flock composition.

A matrix population model showed that decreased breeding success may be sufficient to explain the decline of the Long-tailed Duck population of Western Siberia/North Europe as observed in the Baltic Sea.

A modelling framework for integrating Citizen Science data and professional surveys in ecology: A case study on bird mortality hotspots caused by power-lines

Jorge Sicacha-Parada[1], Diego Pavón-Jordán[2], Roel May[2], Ingelin Steinsland[1], Frode B. Johansen[3], Bård G. Stokke[2]

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The number of data sources related to the spatial distribution of species and events affecting biodiversity is large. Unfortunately, not all these sources of information we have access to are collected in standardized ways. Hence, proposing models that make use of these simultaneously becomes a challenge that needs to be addressed carefully.

The goal of our case study is to find hotspots of bird mortality caused by powerlines in Trøndelag County, central Norway. There are two types of information available: professional (presence/absence) surveys collected by expert scientists where carcasses were searched for with a dog under powerlines and opportunistic records (presence only) of Citizen Scientists across the region uploaded to the national portal 'artsobservasjoner'. We propose a modelling framework that integrates both sources of information, considering their different properties. This framework assumes that the different types of information available have a common underlying process, represented as a Gaussian Random Field. The framework also accounts for the spatial and systematic biases characteristic to Citizen Science data by modelling the observed point pattern as a thinned version of the true point pattern. Our modelling framework lies within the group of Latent Gaussian Models. Hence, it can be easily fitted using the INLA-SPDE approach. We test the models we propose through simulations and comparison criteria against simpler models.

Use of UAVs and deep learning improves monitoring of breeding Herring Gulls

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Monitoring long-term abundance of breeding seabirds provides an important foundation for effective conservation-based research and proper habitat management. The success or failure of conservation strategies will to some extent depend on the documentation of how the populations of the target species develop. Hence, estimates must be reliable in order to be effective. Some of the conventional monitoring of breeding seabirds uses methods such as line transects or point counts. However, the efficiency of such methods relies on observer skills, uncertainties of extrapolations and difficulties regarding the access to view all the individuals or nests in the breeding colony. Unmanned aerial vehicles (UAVs), popularly known as drones, potentially reduce such bias and impacts. In this study, we compare conventional monitoring with drone surveys in large colonies of Herring Gulls *Larus argentatus* in Denmark and we discuss how best to estimate the size of a breeding colony. At most study sites, highly skilled observers using point counts estimated the number of breeding pairs to be only 30–50% of the number of pairs found by analysing images taken by drones. The Trilateral Monitoring and Assessment Programme (TMAP) in the Wadden Sea recommended a correction factor of 0.7 to be used to calculate the number of pairs from the number of counted breeders in the field. In some cases, the number of individuals multiplied by 0.7 corresponded well with the number of nests, but in other cases the ratio between the number of adult birds and the number of nests with eggs or chicks was only 0.5, apparently because many territory holding pairs were late or not in a condition to lay eggs. Counting birds on drone images is very time consuming (taking up to 75 hours per colony), so we are developing an automatic counting method using deep learning, which will potentially save us 90% of the time spent counting.

11:30–12:30 Conference Hall

Common Bird Monitoring

How to fill the geographical gaps in the coverage of Europe by generic bird monitoring schemes?

Petr Voříšek[1,5], Sergi Herrando[2,5], Mikhail Kalyakin[3,5], Verena Keller[4,5]

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The European Breeding Bird Atlas (EBBA2) provided data on species distribution in the whole of Europe. However, the gaps in geographical coverage persist in generic breeding bird monitoring schemes contributing to the Pan-European Common Bird Monitoring Scheme (PECBMS). Many constraints (e.g. large remote areas, insufficient infrastructure, economic situation), still make running the monitoring schemes difficult. On the other hand, capacities have improved during EBBA2, and we aim to build on EBBA2 experience when filling the gaps in common bird monitoring in Europe. The main aim is to deliver data for calculation of European population trends and indices, but in the longer term the aims are also to set up new national monitoring schemes, provide data for population estimates and to contribute to the production of updates of distribution maps. We propose an approach of International Census Plots (ICP) in combination with sub-national regional monitoring schemes as the first steps leading towards new national schemes. In ICP, the census plots are established across a supra-national region and the indices from several countries together will contribute to the European data set. Regional sub-national schemes can be established whenever a region is big enough and the number of fieldworkers is sufficient to cover it. A regional index weighed by regional population size can then contribute to the European data set. Thus, ICP and sub-national regional schemes will be designed in a way that they will be able to contribute to the European monitoring data set before the data is good enough to allow production of national population trend indices. A pilot study in Serbia and the exploration of regional monitoring schemes in Russia have been the first steps we made in our effort to fill the monitoring gaps in Europe.

International Census Plots – a path to the common bird monitoring in Serbia

Radislav Mirić

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It is a well-known fact that long term bird monitoring programs provide important data that contributes to the improvement of our knowledge on bird populations. However, conducting a large-scale breeding bird monitoring such as PECBMS remained out of reach for Serbian ornithologists for years. Main factors responsible for postponing the start of common birds monitoring are lack of interest and support from state institutions, and lack of skilled fieldworkers in most of the country. Over the last two decades, several big bird census programs have been conducted in Serbia, producing results that represent a solid base for the monitoring of breeding bird population dynamics. The capacity of Serbian ornithologists was greatly improved over the past few years in order for Serbia to contribute to the EBBA2 with satisfying amount of data. This increase in capacity and support of the EBCC led BPSSS to accept to partake in a new project called International Census Plots. So called “census plots” were selected semi-randomly, in the sense that in areas which are accessible to the fieldworkers, a random set of 2 × 2 km squares were selected within ETRS grid, in which two 1 km long transects were defined. A total of 34 census plots were successfully visited twice, the first time between April 15th and May 10th, and the second time between May 15th and June 10th. The breeding season of 2021 was set to be a pilot season that will give us insight if some changes are needed in future.

Common bird monitoring in the European part of Russia – first results and near-term prospects

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Since 2010, we have been trying to create a network of routes for the common bird monitoring in European part of Russia, guided by the rules applied in PECMBS. By 2021, this network unites 80 routes up to 10 km long, and participants perform bird counts twice a year, from early May to early June. Still, the distribution of routes is extremely uneven, and their number, of course, is far from sufficient for real coverage of the region. Now, an adequate statistical analysis is possible only for a set of routes in Moscow, the Moscow region and its immediate vicinity. There are 57 routes and some of them were studied even before our project started (over 10 years; 6.8 years on average). The general tendencies were similar to those in PECMBS countries, with open-landscape birds declining more than forest ones and long-distance migrants more than short-distance ones or non-migratory species. Currently, the PECBMS team assesses these data for integration into the system; one of the obvious problems is the spatial separation of our region from other participating countries. The accumulated experience allowed us not only to identify methodological difficulties but also to understand a set of problems that need to be solved in order to create a more extensive and stable monitoring network. Thanks to the help of the coordinators of the pan-European monitoring system, the solution to methodological problems does not seem to be complicated, but the ways to attract new reliable observers require new, non-standard approaches.

State of common birds in Bulgaria 2021: Results from 17 years of common bird monitoring

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The Common bird monitoring scheme in Bulgaria started in 2005 based on the British Breeding Bird Survey. This material presents the methodology and results for the state of common birds for the period 2005–2021.

Data are collected in 1 km^2 survey plots which are randomly selected. Observers may choose survey plots from a random selection of 5 1 km^2 in each 10 km^2 UTM square in the country. Each survey plot is visited twice in the breeding season to cover early breeders and late arrivals: first visit is in the period April 15th – May 15th, and second visit is in the period May 16th – June 15th. Data are collected with the mobile app SmartBirds Pro with a few observers still preferring paper forms. All data is entered into the online database SmartBirds.org. Observers are asked to record distance to the birds in distance belts, species name and number. Habitat is not recorded in the current version of the mobile app. Data analysis and trend production are performed using BirdSTATs and Trim. For data analysis only survey plots that are counted at least three years are included.

In 2021 we assessed the trends of 84 bird species which were registered in more than 20 survey plots and where the standard error of the slope was <0.05. Trends are based on 221 survey plots distributed unevenly around the country. From all 84 species, 21% are declining, 17% are stable, 26% are increasing and 36% have uncertain trend category. The farmland bird index shows a decline of 25%.

The material presents recommendations for further improvement of the monitoring scheme with regards to data collection and analysis.

11:30–12:30 Seminar Hall

Methods and analytical techniques 2

Beyond bespoke: standardized integrated population models reveal drivers of population dynamics of migratory birds across latitudes

Chloe Nater[2], Malcolm Burgess[3,4,5], Rob Robinson[1]

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Identifying key drivers of population dynamics for migratory species is challenging because they are exposed to a variety of different environments throughout their annual cycle. Nonetheless, such knowledge is often crucial for guiding conservation efforts to prevent and reverse decline of species of conservation concern. Many species of migratory birds fall into this category and the recent rise of integrated data analysis has given unique insights into the drivers underlying dynamics of single populations. Conclusions from such analyses are, however, often variable and difficult to compare, and standardized analyses of multiple populations may be necessary to obtain insights relevant to larger spatial scales. We developed an integrated population model for multiple datasets of pied flycatchers (*Ficedula hypoleuca*), but which is general enough to be applied to datasets of other similar hole-nesting bird species and can be efficiently implemented by being directly linked to the standardized data format provided by the SPI-Birds data hub, a growing database for long-term individual based studies. By fitting the model to mark-recapture and nest box survey data from seven populations of pied flycatchers breeding at different latitudes encompassing the UK distribution. We show substantial variation in both averages of and environmental impacts on key demographic parameters across populations and substantial covariation in population change and survival among the different breeding populations. We thus showcase how integrated population models, which are usually tailored to one specific study population, can be generalized to provide a multi-population perspective of demographic drivers across large spatial scales, and highlight the importance of facilitating their use by linking them to relevant databases.

The power of occupancy models for territory-based bird population studies: a mini-review

Marc Kéry

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In the 20 years since their discovery, occupancy models (MacKenzie et al. 2002, 2003; Tyre et al. 2003) have had a tremendous impact in multiple branches of biology and its applications, including population ecology, biogeography, and the analysis of biodiversity monitoring programs. Typically, these models are applied in cases where a “site” is occupied by an undetermined number of individuals and where therefore all inferences are about presence/absence only, such as in typical species distribution modeling applications. However, right from their beginnings (i.e., MacKenzie et al. 2003) they have also been applied to the presence and absence of a species in more or less well-defined territories in bird population studies. In this case, instead of mere presence/absence, these models deal with population abundance instead. This is a fundamental quantity in ecology and management alike and the territory-level rates of change over years are then fairly narrowly related to individual-level recruitment and survival rates (indeed, Roth & Amrhein 2010, have formulated a model that enables formal inference about the latter from territory occupancy data). I will give a mini-review about the power of occupancy models for territory-based bird population studies and, from my own work or that of colleagues and publications in the literature, give examples for the benefits of occupancy models for this classical type of avian study, which include correction for imperfect recognition of occupied territories, random incomplete coverage of territories, preferential sampling and the estimation of individual-level demographic rates from

territory occupancy data. I will argue that occupancy modeling belongs to the core analytical skills of an analyst in every territory-based bird population study.

What do we gain by increasing model complexity? A comparison among several SDM approaches tested for EBBA2

Pietro Milanesi[1], Thomas Sattler[1], Petr Voříšek[2,8], Verena Keller[1,8], Frédéric Jiguet[3], Alison Johnston[4], Lluís Brotons[5], Nicolas Titeux[6], Sergi Herrando[7,8]

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Modelling the distribution of breeding birds for the Second European Breeding Bird Atlas (EBBA2), promoted by the European Bird Census Council (EBCC), was challenging and required the test and development of robust statistical procedures to provide accurate maps of species distribution. To develop the maps of EBBA2, we explored several modelling options to include two often neglected but very important factors that drive our understanding of species distribution, i.e. imperfect detection and spatial-autocorrelation in addition to environmental variables. Consequently, we compare weighted ensemble predictions (wEPs) derived by averaging of eight species distribution model techniques (SDMs), considering a) 40 environmental predictors and alternatively including either b) imperfect detection or c) spatial-autocorrelation or including both, d) imperfect detection and spatial-autocorrelation.

As a basis, we used a dataset of more than 900,000 records of 224 breeding bird species in Europe, detected during more than 35,000 standardised surveys carried out in the period 2013–2017.

Here, we show resulting weighted ensemble predictions maps derived by different approaches mentioned above and compare the predictive accuracy of SDMs through measures of model performance, e.g. area under the curve (AUC) and true skill statistic (TSS).

[cancelled]

Spatially-explicit high-resolution population trends from semi-structured citizen science data

Alison Johnston[1], Daniel Fink[1], Amanda Rodewald[1], Matt Strimas-Mackey[1], Tom Auer[1], Shawn Ligocki[1], Wesley Hochachka[1], John Sauer[2], Lauren Oldham[1], Orin Robinson[1], Chris Wood[1], Steve Kelling[1]

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Monitoring of bird populations has historically been conducted with structured surveys, which control the variation in methods and locations of surveys. However, there is a huge volume of semi-structured citizen science data that contains information on population changes, but this ecological signal is confounded by interannual variation in where, when, how, and who is contributing data. We used data from eBird together with innovative machine learning models to account for these data challenges. Using this approach, we generated high-resolution estimates of population change for 451 bird species from 2007–2019 across North America. These estimates provide spatially-explicit estimates of bird populations at a resolution of 27 × 27 km across the continent. We validated the trend estimates with two approaches. First, we ran the models with simulated data and found there was high power to detect population change, and low false detection rates at 27 km resolution for many species. Second, we compared regional estimates between the North American Breeding Bird Survey and eBird trends. We found that eBird estimates were unbiased relative to the BBS estimate, and that both point and interval estimates were aligned for a large number of species and regions.

The high resolution eBird trends revealed new locations of population change for individual species and communities. Over 97% of species had areas of both population growth and decline across their breeding ranges, and many strong fine-scale patterns of population change were revealed among

communities of species. These high-resolution trends provide a novel, valuable source of ecological information at scale to help understand causes of bird declines and plan conservation actions. These results add to a growing literature demonstrating how to uncover ecological information from semistructured citizen science data.

14:15–15:15 Conference Hall

Bird distribution and atlas work 1

The Eurasian African Bird Migration Atlas – documenting migration and movements using ringing and tracking data

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The online Eurasian African Bird Migration Atlas project (due late February 2022) provides vital information for bird conservationists and ecologists. At its core the Atlas is an online tool documenting the movement patterns of some 300 bird species based on over 100 years of ringing data from the EURING databank, as well as tracking data from Movebank. The Atlas draws on data from all major European Ringing Schemes and the core project team involves researchers from nine European countries. We outline how these data have been analysed to provide a robust picture of the migration patterns of different species and populations using large-scale and long-term ring recovery data, with tracking data additionally providing more detailed movement information for a more limited sample of individuals and populations. The Atlas is based around maps showing the overall migratory connectivity patterns of different regional populations, how these patterns vary according to different seasons, seasonal movements throughout the annual cycle, and patterns according to cause of recovery. There are also a range of infographics documenting the nature of the dataset and potential biases in time and space. While acknowledging the potential biases resulting from different recovery causes, we show how the Migration Atlas outputs can be combined to understand avian movement patterns, and that for most species the available data provide a robust picture of bird migration. Within the Atlas project as a whole, these species-specific recovery analyses are linked to more detailed analyses of migration timing, migratory connectivity, impacts of illegal killing and long-term changes in movement patterns.

An offshore bird atlas for the German North Sea: distribution, numbers and trends of seabirds at sea

Nele Markones[1,2], Kai Borkenhagen[1,2], Henriette Schwemmer[1,2], Nils Guse[2], Volker Dierschke[3], Stefan Garthe[2], Moritz Mercker[4]

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In the German North Sea, a seabird monitoring programme has been carried out since 2008 as part of the Marine Biodiversity Monitoring of the Federal Agency for Nature Conservation. The monitoring scheme supports the implementation of management plans in MPAs and provides the necessary baseline for fulfilling reporting commitments according to the relevant directives of the European Union (Birds Directive, MSFD) and to the regional marine conservation conventions (OSPAR, HELCOM). Bird abundance is assessed from ships and planes, applying internationally standardized line-transect Seabirds

at Sea methodology and distance sampling techniques to account for distance-dependent detection errors.

By complementing seabird monitoring data with additional long-term ship-based and aerial survey data from monitoring and research projects of Kiel University, we achieved a comprehensive dataset of seabirds at sea abundance in the German North Sea from 1990–2016.

We developed a new analytical procedure for estimating population numbers and trends of seabirds at sea that allows integration of bird-count data from different sampling methods (i.e. ship-based and aerial surveys). Accounting for effects of various environmental and detection-related covariates on bird count numbers, our approach supports the reduction of bias and noise and thus produces more accurate and reliable estimates of population numbers and trends.

Applying the new statistical approach to our long-term dataset, we estimated population numbers and trends for 19 common seabird species in the German North Sea. In addition, we used our abundance models to predict offshore seabird densities and generated seasonal distribution maps. Population trends of gulls and most pelagic species were strongly negative, numbers of seaducks, Northern Gannets and Little Gulls in offshore regions increased.

Elevation shifts in the Swiss breeding bird community: teasing apart climatic and habitat effects on the distribution dynamics

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Predicting the distribution of species remains a challenge, particularly when ranges are changing. In these cases dynamic models allowing a mechanistic modeling of the underlying causes of occupancy change, i.e. colonization and extinction events, may provide a better framework to analyse distribution changes over time. We combined four disparate datasets (two breeding bird atlases and two common breeding bird survey schemes) in a single modeling framework to identify elevation shifts and drivers of the distribution dynamics of the community of Swiss breeding birds over 25 years. We used dynamic site occupancy models (MacKenzie et al. 2003) which allowed us to explicitly express occurrence changes as a function of colonization and persistence processes while accounting for imperfect detection. These models provide an explicit way of modeling the observation process. It was thus possible to rigorously account for the differences in the sampling protocols and in the observation intensity during the whole study period. We used climatic and habitat covariates to model the colonization and extinction probabilities to investigate possible effects of land use and climate changes. We first looked for elevation shifts in the distribution of 97 common species and found that 42 species increased their average occupied elevation during the last 25 years. Most of them were alpine or forest species. In a second step we quantified the relative importance of habitat and climate on the dynamics. Climate appeared to be a slightly more important driver of colonization while the results were less clear for extinction, except for alpine species for which habitat played a larger role.

Ecological barriers drive spatiotemporal shifts of bird communities

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Climate change forces species to adapt, move or go extinct. Therefore, species' range shift speeds and local extinction rates vary, leading to community composition changes. It is important to study shifts of entire communities because ecological interactions within communities shape community's functionality. At large spatial scales, community' ability to adapt and move is influenced by ecological barriers that form dispersal boundaries between ecosystems. To understand how ecological barriers (coastlines, biome boundaries, elevation and climate change) influence community shifts at large spatial scales, we quantified geographic distance and direction of bird community composition shifts across Europe. We used European Breeding Bird Atlas data from over four decades when global change impacts on

biodiversity have accelerated. The atlas data provide a unique opportunity to study community shifts at large spatiotemporal scales. We calculated the geographic distance and direction from each 50 × 50 km atlas grid cell in 1980's to the atlas grid cell in 2010's with most similar bird community composition. We found that ecological barriers determined both the distance and direction of bird community composition shifts. Importantly, bird communities did not shift consistently to any one direction. The lack of consistent northward shift indicates that climate change alone cannot explain the shifts. Of the four barrier types, the constant barriers, coastlines and elevation, had the strongest influence on observed community shifts. The strong effect of ecological barriers on community shifts shows that the barriers should be implemented into global change studies to ensure realistic predictions of biodiversity shifts. Moreover, understanding barrier effects on community shifts has conservation implications. As ecological barriers pose strict limits to spatiotemporal shifts, many species beyond high latitude/elevation specialists will be of major conservation concern. Linking ecological barriers and community shifts can identify major shift barriers and guide placement of large-scale ecological corridors that facilitate movement between suitable areas.

14:15–15:15 Seminar Hall

Drivers of change 1

Population changes of forest birds in Czechia: decomposition of possible drivers

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Forest is a species-rich environment inhabited by various bird species associated to different habitat types. Although recent studies indicated that forest species perform better than farmland birds in Europe with possible benefits from forest management, the links between bird population changes and the state of forest habitats remain poorly known. Studying such links may be informative about the impacts of forest management on biodiversity. To bridge this knowledge gap, we performed a multiscale study based on data collected within a country-wide breeding bird monitoring scheme from 1982 to 2019 in Czechia, a central European country. First, we specified nine bird groups according to the species' habitat associations in respect of forest stand size, vegetation layers and tree species composition, and calculated an annual multispecies indicator (MSI) for every bird group at the country level. Second, we used the site-level data and calculated trends in specific forest habitats for selected species. According to MSIs, populations of forest birds generally increased, and this trend was partly driven by birds of forest canopy and birds of broad-leaved forest, whereas populations of shrub layer species decreased. These patterns are consistent with forest maturation, increasing wood volume and replacement of coniferous by broad-leaved stands that took place in Czech forests over several decades. Interestingly, habitat-specific trends based on the site-level data do not correspond with these patterns. Specifically, we did not find systematic differences in trends between forest habitat types within species. Instead, increasing species increased and declining species decreased across habitats differing in vegetation layers and tree species composition. This may be caused by the influence of factors acting outside forest environment (e.g., urbanization). Since the species contributing to the habitat-specific trends are mostly generalists occurring both in forest and elsewhere, the changes in forest habitats may have limited impact on their populations.

The rise and fall of coniferous forest birds in Belgium

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As in many other parts of Europe, forest cover increased substantially in Belgium since the 19th century, mainly by afforestation of heathland, pasture and other poor agricultural soils with non-indigenous coniferous trees, especially Norway Spruce in Wallonia, the region with the highest woodland share in the landscape (33%), and Scots Pine in Flanders (total woodland cover of 11%). Until recently, the share of monospecific coniferous tree plantation was as high as 45% in both regions. Consequently, from the 19th century, at least 11 forest bird species associated to or even specialised in coniferous forest progressively settled in Belgium. Some of them (Goldcrest *Regulus regulus*, Firecrest *R. ignicapilla*, Coal tit *Periparus ater*, Crested Tit *Lophophanes cristatus*) are so widespread that their population trends are used in a "coniferous bird indicator". Recently, a strong decline of their population was detected in both regions (in Wallonia, –2.6%/year since 2010). In the same period, pure coniferous woodland cover is also slightly decreasing as a consequence of forest management and following severe bark beetle outbreaks. However, the decline in bird population is faster than the loss of coniferous areas. In this paper, bird abundance changes are assessed at the site level to address the question of the causes behind the decline, more precisely if weather or health condition of coniferous plantations could accelerate this observed decline. Trend comparison between regions where Scots Pine constitutes most of the plantations with regions where spruce tree dominates suggests an impact of spruce bark beetle outbreaks. Other possible changes in the coniferous bird assemblage (e.g. frequency of Common Crossbill *Loxia curvirostra* irruption) will also be examined and trends of species using both deciduous and coniferous stands (like Common Chaffinch *Fringilla coelebs*) will also help disentangle the different driving factors behind the trends.

Population dynamics of many central European forest birds is driven by forest tree seed crop

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The seeding intensity of our most important forest trees (beech, oak, pine, spruce) is subject to strong annual fluctuations and is (also) driven by weather conditions during blooming and seed maturation periods as well as physiological factors. On the basis of annually published 'blooming records' of the German state forest administration and the seed crop of certified seed tree stands we can show that the fructification of forest trees is highly synchronised over large parts of Germany. Moreover, since seed crop of different tree species is driven by similar weather parameters, seed masts are also partly synchronised between several tree species. This leads to large-scale resource pulses for seed-eating birds.

The tree seed crop during winter is an important factor which may determine winter mortality and population size in the subsequent breeding season for many seed-eating resident and partly migratory birds. For several species it is known that parameters like abundance, clutch size and breeding success depend on winter survival and tree seed crop in the previous winter. However, their occur also indirect dependencies on tree seed crop for some long-distance migrants, driven e.g. by small mammal abundances or competition for nesting cavities.

By analysis of a 25 year data set from the German common bird monitoring we can show, that on a large spatial scale the annual population fluctuation of at least 16 bird species is directly or indirectly driven by tree seed crop, but not by coldness/severity of the previous winter. Among the forest trees, beech and oak are of special importance. Through long-term variation in seed mast frequency (e.g. in beech), not only the annual fluctuations, but also the medium to long-term population trends of forest birds might be influenced. Our results challenge claims that resident or partly migratory forest birds like pigeons, tits, finches, Eurasian Nuthatch *Sitta europaea* or Spotted Woodpecker *Dendrocopos major* would suffer from severe winters.

Predator-prey systems with shared resources: woodpeckers, bark beetle, and deadwood

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Bark beetle outbreaks are resource pulses that generate large amount of deadwood and prey items for insectivorous predators. Outbreaks of Spruce Bark Beetle (*Ips typographus*, SBB) often follow disturbances such as storms and droughts. SBB is an important prey of the Three-toed Woodpecker (*Picoides tridactylus*, TTW), and can have a relevant role also for other woodpecker species. Long-term effects and delayed responses between the abundances of SBB and TTW (and other woodpeckers) have not been studied thoroughly, and the responses of other woodpecker species to changes in SBB abundance have not been addressed at all. Here we use long-term monitoring datasets to assess how populations of TTW and other woodpecker species are related to SBB abundance. In particular, we investigate to what extent SBB outbreaks elicit woodpecker population responses in the short and long term. Furthermore, we model the importance of deadwood for the woodpecker species per se, or as a resource linked to SBB outbreaks. We expect that SBB outbreaks will have positive direct effects on the abundance of bird species for a short time (i.e., the years following the outbreak). As the prey resource pulse will decline, we expect the relationship with bird abundance to get weaker. However, increased woodpecker abundance relative to the pre-outbreak period may still be expected following the predicted outbreak-driven deadwood increase, which will likely support nest sites and other wood-boring insects. Finally, our model can be used to estimate the role of SBB outbreaks in influencing bird population trends and whether birds contribute to a decline of SBB infestations over time.

16:45–18:00 Conference Hall

Bird distribution and atlas work 2

A first look at the results of the 2nd Austrian breeding bird atlas

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After having conducted the fieldwork in 2013–2018, data validation and analysis are now almost complete and the new Austrian atlas is close to publication. In this talk I will report on the experiences we made during analysis, on the obstacles and the solutions we applied, and I will show some results to illustrate our approach.

The timespan for analysis was substantially longer than we initially planned. The main reasons were funding issues as well as considerable additional effort required for data validation and data handling. Further difficulties arose from the planned comparison maps with the old atlas, for which data had been surveyed in the period 1981–1985. For this dataset we had to tackle the problem of partially incomplete old data, as well as the problem of differing grid systems. A further obstacle arose from the sampling coverage, which differs markedly between the two atlas periods. This difference is not uniformly distributed over the country but is most pronounced in some of the alpine regions. The applied solution for the comparison of the two atlas periods comprises (1) using a rather coarse grid, (2) completely excluding some very poorly sampled grid cells, and (3) marking grid cells where the sampling effort differed to a greater extent between the two atlas periods.

In order to provide a more detailed picture of recent distribution of more common and widely distributed breeding bird species, we modelled presence/absence using machine learning algorithms. I will also preview a selection of these model maps.

The Catalan Breeding Bird Atlas – Distribution and abundance 2015–2018 and change since 1980

Martí Franch[1], Sergi Herrando[1], Marc Anton[1], Dani Villero[2], Lluís Brotons[2]

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The new Catalan Breeding Bird Atlas is the third one to study the distribution of all breeding species in Catalonia in the last 40 years. Thanks to the efforts of over 1,000 fieldworkers, this atlas documents the distribution and abundance of 233 breeding bird species in the period 2015–2018. Furthermore, this third Atlas has a strong focus on the changes in bird populations. Together with the two previous atlases, it allows to analyse distribution changes in the long term (since 1980) and the short term (since 2002), complemented with abundance changes based on the Catalan Breeding Bird Survey (2002–2018) and specific monitoring schemes. Specific standardised surveys were carried out in almost 1,700 squares of 1 × 1 km both in the second Atlas (1999–2002) and the third one (2015–2018). This allowed mapping the changes in probability of occurrence across Catalonia for more than 50% of the breeding species, revealing geographical patterns unseen until now. Overall, the number of breeding species in Catalonia has remained quite stable in the last decades, and most gains and losses are related to irregular breeding species or improvement in coverage or knowledge. However, many breeding species have experienced diverse population variations. This atlas documents impressive changes in distribution and abundance, both at species and community level.

Bird atlas in breeding season

Blas Molina, Juan Carlos Del Moral, Aaron Nebreda

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The Atlas program in spring is one of the programs that SEO/BirdLife maintains as a fundamental tool to work in the conservation of birds. The last atlas made in Spain corresponds to the years 1998–2002. The new atlas will be the third, carried out in 5 years (2014–2018). The information in this atlas provided the data for EBBA2. On this occasion, not only the breeding species have been recorded, but also the non-breeding species that use Spain in spring.

In this new atlas information was obtained from 5,311 squares (95% of those available), although complete data was obtained for 2,778 of them, which represent practically 50% of the territory. In some provinces or community regions practically total coverage was obtained.

In addition, other samplings were carried out that allowed to model the distribution, calculate populations and the selection of habitat. On the other hand, information from other monitoring programs was used that complemented the information from the atlas. Thus, information was available from the Common Bird Monitoring Program and Night Bird and Owls Monitoring Program, as well as ringing data. Specific censuses of 14 species were also carried out.

In addition, other data were provided by the organization's working groups: Bird News, Rarities Committee and Exotic Birds Committee of the SEO/BirdLife. Likewise, data from the Ebird, Ornitho and Observation platforms or on-line bird recording portals was reviewed and added.

Information has been obtained on 453 species, most of them, 289, are breeding birds and autochthonous and make up 64% of the species present in the breeding season in Spain. Another 69 species (about 15%) are cases of notable presence during the breeding season, although they certainly do not breed there. In addition, 56 exotic species and 39 species that are considered rare were detected.

Rapid shifts in the elevational distributions of Swiss birds and associated species traits

Tyler Andrew Hallman, Jérôme Guélat, Sylvain Antoniazza, Marc Kéry, Thomas Sattler

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In response to climate change, species shift their geographic and elevational distributions. In mountainous regions, uneven rates of land use change across elevational gradients, such as lowland agricultural intensification and high elevation land abandonment, can simultaneously drive elevation shifts. Species traits that predict response to change in climate and land use are valuable in identifying species of conservation concern. Here, we explored elevation shifts in Swiss birds over a 20-year period, and associated species traits. We used abundance models from two Swiss breeding bird atlases (1990s and 2010s) to estimate abundance-weighted elevational distributions. From these, we propagated uncertainty and calculated five elevational reference points including the leading edge, trailing edge, and core of their elevational distributions. We estimated change in reference points and modeled the relationships between elevational shifts and species traits associated with resource preference and adaptive capacity. We found significant upslope and downslope shifts in 58% and 27% of our study species, respectively. Asymmetric rates of shifts in the leading and trailing edges of their elevational distributions caused significant contractions in elevational extent in 30% of our study species. Habitat and elevational preference had a strong interactive effect. Movement in alpine birds was unidirectionally upslope, with nearly half displaying significant or near significant elevational range contractions. Asymmetries in the rates of movement in woodland birds were elevation dependent, with expansions in elevational extent for low elevation species and contractions for high elevation species. Migrants showed greater upslope movement than non-migrants while diet, habitat, and elevational generalists showed greater upslope movement than specialists. While response to global change is species-specific, species traits associated with resource preference and adaptive capacity are associated with common patterns of elevation shifts and can be used for conservation prioritization.

Applying EBBA2 distribution models to conservation: a practical example with European Turtle Dove

Carles Carboneras[1], Susana Requena[1], Sergi Herrando[2,6], Dani Villero[3], Lluís Brotons[3], Pietro Milanesi[4], Beatriz Arroyo[5]

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The 2018 International Species Action Plan for European Turtle Dove *Streptopelia turtur* aims to halt and revert the species' widespread decline. One of its core priorities is to improve habitat management, and urges competent authorities to identify and designate Priority Intervention Areas (PIAs) for dedicated management. However, high-resolution data on Turtle Dove distribution is lacking for part of the breeding range.

The Species Distribution Models developed for the second European Breeding Bird Atlas (EBBA2) predict species' probability of occurrence (PO) across Europe, including in data-poor areas. For Turtle Dove, PO was largely determined by geographic factors (Lat, Lon, mean annual temperature), with highest probabilities expected south of parallel 48°N and much lower values further north, even though suitable habitats may be available. Land cover and habitat structure had a weak role in predicting PO at continental scale, which might be explained by spatial variation in the species' habitat and land use associations.

We developed a methodology to identify Turtle Dove PIAs from the spatial patterns revealed by EBBA2. We categorised areas according to their potential as PIAs and applied spatial analysis techniques and information on landscape composition on a finer scale, to determine the associations with land use – which are known to occur. We contrasted those areas with the EU Natura 2000 network of sites, on the assumption that their site management plans may provide effective tools for the implementation of the Species Action Plan.

We present a map of EU Natura 2000 sites ranked against their predicted value as Turtle Dove PIAs and landscape characteristics. For the rest of the range, we present the spatial identification and

quantification of PIAs not included in Natura 2000. Our work allows identifying priority areas for intervention, to progress towards effective implementation of conservation interventions proposed by the Species Action Plan.

16:45–18:00 Seminar Hall

Drivers of change 2

Contrasting trends of widespread forest and farmland birds in Europe: an analysis of trends, uncertainty and species selection

Richard D Gregory[1], Jana Škorpilová[2], Petr Voříšek[2], Simon Butler[3]

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Composite, multispecies biodiversity indices are increasingly used to report against international and national environmental commitments and targets, the Wild Bird Index being a prominent example in Europe, but methods to assess trends, error and species selection for such indices are poorly developed. In this study, we compare methods to compute multispecies supranational indices and explore different approaches to trend and error estimation, the presentation of indices, and species selection. We do so using population trend data on forest and farmland birds from 28 European countries, 1980–2015. We find relative stability in common European forest bird populations over this period, but a severe decline in farmland bird populations. Altering the benchmark year affects index characteristics and ease of interpretation. We show that using annual species' indices and their SEs to calculate confidence intervals delivers greater precision in index estimates than bootstrapping across species. The inclusion of individual species within indices has limited leverage on index characteristics, but subjective selection of species based on specialisation has the potential to generate bias. Multispecies indices are valuable policy-relevant tools for describing biodiversity health. Their calculation and presentation need to be tailored to meet specific policy objectives, and they must be supported by clear interpretative information. We recommend methods for indicator analysis, forms of presentation, and the adoption of an objective species selection protocol to ensure indicators are representative and sensitive to environmental change.

Potential drivers of Common Starling and House Sparrow abundance across two continents

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The Common Starling *Sturnus vulgaris* and House Sparrow *Passer domesticus* are two iconic European farmland birds that have experienced steep population declines in both their native European ranges and non-native range in the United States (U.S.) over the last 50 years. Their concurrent decline across two continents is surprising given that these species are common, widespread, and associated with humans. European declines have been attributed to habitat loss and changes in food availability resulting from agricultural intensification; reasons for decline in the U.S. are unknown. Moreover, it is unknown whether population drivers differ between the species' native and non-native ranges. To investigate influences of land cover, climate, and agricultural intensification on these species' abundances, we fitted generalized linear mixed models to ~20 years (1992–2013) of site-level count data from 26 countries participating in the Pan-European Common Bird Monitoring Scheme and route-level count data from the Breeding Bird Survey in the U.S. Preliminary results for House Sparrow suggest differences between population drivers in Europe versus the U.S. In Europe, average March temperature and the local proportion of urban land had the strongest positive effect on site-level abundance (hereafter,

abundance). Abundance also increased with the proportion of grassland and irrigated cropland. In the U.S., the local proportion of irrigated cropland had the strongest positive effect on abundance. In addition, abundance was positively associated with more types of land cover in the U.S. than in Europe, suggesting more plastic habitat requirements in the species' non-native than native range. Next steps include fitting corresponding models for Common Starlings, and the inclusion of metrics of agricultural intensification and drought for both species. Our findings could inform regional conservation/management and land use policy to support Common Starlings and House Sparrows in their native ranges and reduce them in their non-native ranges.

Exploring the effects of intensifying agriculture upon Romanian farmland bird communities

Zoltán Benkő[1,2]

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Biodiversity loss caused by the intensification of agricultural practices is a well-studied topic in recent years. One of the drivers of this process is the reduction of landscape heterogeneity that may lead to biological homogenisation across the farmland bird communities. Although several studies have addressed this problem, our knowledge from Eastern Europe is still very limited, most of all on the extent of biological homogenization and biodiversity loss caused by the ever-intensifying agriculture. This knowledge gap mainly persists because of the lack of suitable data.

To explore the effects of agricultural intensification on the farmland bird communities in Romania, we used the data from 341 2 × 2 km Common Bird Monitoring (CBM) squares (237 squares from arable land and 104 squares from grasslands) with 10 point counts each, and the available information on agricultural productivity provided by the Romanian Agricultural Ministry. Using the point level data, we calculated for the 80 most common species a habitat specialization index. The specialization of the communities on each CBM square was obtained by taking the mean of the species specialization indexes of every individual of these species present on the squares, while we also calculated the diversity of the communities using the Shannon-Wiener index. We explored the relationship between the agricultural productivity (crop yield, fertilizer and pesticide use, grazing intensity) and the community specialization and diversity. Our results suggest that high production is related to highly specialized and less diverse farmland bird communities in Romania.

Effects of compositional and configurational crop heterogeneity on farmland bird abundance and diversity

Claudia Frank[1,2], Lionel Hertzog[3], Sebastian Klimek[3], Marcel Schwieder[4,5], Gideon Okpoti Tetteh[4], Hannah Böhner[6], Norbert Röder[6], Christoph Sudfeldt[2], Holger Kreft[7], Johannes Kamp[1,2]

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Agricultural management and landscape structure have been changing strongly across Europe over the past decades. Simplified crop rotations and portfolios as well as an increasing size of management units (fields) resulted in an ongoing landscape homogenization. Landscape configuration (size, shape and spatial arrangement of land-use patches), in addition to their composition (proportion and heterogeneity of land-use types), has been proposed to be a key determinant of biodiversity patterns and associated ecosystem services in agricultural landscapes. Recent evidence suggests that enhancing landscape heterogeneity by increasing crop heterogeneity itself can be an effective way to benefit biodiversity. However, the responses of species abundance and diversity to field size and crop heterogeneity are also likely to differ with varying landscape complexity (e.g. amount of woody elements). Yet,

biodiversity benefits could be achieved by increasing crop heterogeneity without taking land out of production.

We combined a large dataset on common farmland bird abundance from the German Common Breeding Bird Monitoring with novel products derived from dense time series of remote sensing data. From these, we derived the diversity of functional crop types and measures of field size. Although farmland bird species can be affected in different ways by landscape structure, those that share ecological traits might also exhibit similar responses to compositional or configurational crop heterogeneity. Across countrywide gradients, we tested whether effects of crop diversity and field size on bird abundance and diversity are modulated by the density of woody features in the landscape and whether responses differed by functional and ecological traits of farmland birds. Based on our results, we will discuss the impact of recent changes in agricultural landscapes on bird populations in Germany and develop recommendations for agricultural policies that aim at preserving farmland birds while considering landscape composition and configuration.

Woodlark *Lullula arborea* habitat in mosaic agricultural landscape

Primož Kmecl, Katarina Denac

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In Slovenia, Woodlark *Lullula arborea* has its stronghold in the Submediterranean part in the southwest of the country, whereas a small, disjunct and declining population can be found in mosaic agricultural landscape at Goričko (NE Slovenia). In 2021, we surveyed habitat use of Woodlark in Goričko on 150 plots sized 150 × 150 m (2,25 ha), drawing the location of each registered individual on digital orthophotos. The same number of control plots was chosen randomly in the western part of the area, where the species is absent. Habitat mapping was performed on all 300 plots after the end of the breeding season. Boosted regression trees analysis was performed which produced a model with high descriptive and predictive power. Altogether 24 habitat and landscape variables were evaluated. Woodlarks preferred higher altitudes with no or gentle slopes, a higher percentage of extensively used meadows or meadows under medium intensity use, cart tracks, a lower percentage of traditional orchards and an optimal percentage of wood at 40–70%. Meadows and cart tracks are its foraging sites, offering patches of bare soil, whereas the surrounding wood is used as cover against predators. Traditional orchards are often located very close to or in settlements; the latter seem to be avoided by the species. Apart from that, their grass turf is usually very dense, without patches of bare soil, required by the species. It is worth noting that in the beginning of breeding season, Woodlarks were often observed feeding on bare arable fields and set-aside. Nests were found in meadows, (annual and multiannual) fallow land and winter cereal. Conservation measures should focus on preserving the existing extensive meadows, extending their range and actively protecting the nests.

Friday 8 April 2022

10:00–10:45 Conference Hall

Population and distribution trends

Harnessing hidden data treasures for bird population trend estimates in the Eurasian flyways

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The rapid increase in the availability of citizen-science data and the development of biodiversity monitoring programs facilitates an increasingly global quantification of biodiversity patterns in time and space, including bird population trends. However, large regions remain that contribute little data, leading to bias in global analyses. One such region is the former Soviet Union with its successor states that together cover a sixth of the Earth's surface. The poor consideration of data from these states in large-scale analyses is not due to a lack of available data, but due to scientific isolation during Soviet times, language barriers and the resulting development of methods and databases independent from global initiatives.

This data gap is unfortunate, as the successor states of the Soviet Union host large breeding populations of many Palearctic species, including most of the birds migrating along the Central and East Asian flyways. These flyways are the least studied, but are subject to a number of threats due to fast development in Asia, and harbour a large number of globally threatened species.

We harness published and unpublished data on population densities and abundance indices of breeding birds across the former Soviet Union for the period from 1980 to 2020 that are currently inaccessible or underused for large-scale synthesis. We will establish continent-scale population trends based on a meta-analysis approach, with the aim to develop hypotheses on the main drivers of these trends. These are, among others, forest transitions and persecution on the wintering grounds in South and East Asia, and climate change and land abandonment on the north Eurasian breeding grounds. We also aim to compare trends of populations within protected areas with those of populations breeding outside of such sites.

Diet and distribution changes as drivers of changes of wetland habitat use in waterbirds wintering in Czechia

Zuzana Musilova[1], Petr Musil[1], Jan Zouhar[1,2], Adéla Šenkýřová[1], Diego Pavón-Jordán[3], Petri Nummi[4]

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Understanding species habitat use and factors affecting changes in their distributions are necessary to promote the conservation of any biological community. We evaluated the changes in wetland use of the non-breeding waterbird community. Based on long-term citizen-science data (1988–2020), we analysed species-specific wetland use of 25 species of waterbirds wintering in Czechia. The analyses explained variability in trends in numbers of the studied waterbird species across four inland wetland types: reservoirs, fishponds, industrial waters created by flooding of former mining areas, and running waters. Trends in waterbird abundance positively correlated with species´ diet on fishponds, industrial and running waters. Among the diet groups, invertivores showed the largest increase in abundances on industrial waters, closely followed by herbivores. Herbivores showed the largest increase in abundances in

fishponds, and piscivores did so in running waters. Regarding range-shift drivers, species with higher site affinity showed higher abundances on running waters, while species with low STI were more abundant on reservoirs. The abundance of both warm-dwelling and species with low site affinity increased on fishponds and industrial waters. Our findings suggest that the increased importance of the wetland types considered here for wintering waterbirds is likely linked to diet-related changes in habitat use and changes in species distributions; and highlight that wintering waterbirds are expected to select sites with higher availability of food, higher energy content and lower foraging cost. Recent and rapid changes in species distributions may lead to a decrease in the effectiveness of national and international conservation efforts. When planning conservation measures, it should be kept in mind that climate change does not only imply large-scale north/north-eastwards shifts of entire waterbird distributions, but can also modify the use of the habitats by waterbird species inside their traditional wintering range.

Short-lived species move uphill faster under climate change

Josephine Couet, Aleksi Lehikoinen, Emma-Liina Marjakangas, Andrea Santangeli

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Climate change is pushing species ranges and abundances towards the poles and mountain tops. Although many studies have documented local altitudinal shifts, knowledge of general patterns at a large spatial scale, such as a whole mountain range, is scarce. From a conservation perspective, studying altitudinal shifts in wildlife is relevant because mountain regions often represent biodiversity hotspots and are among the most vulnerable ecosystems. Here, we examine whether altitudinal shifts in birds' abundances have occurred in the Scandinavian mountains over 13 years, and assess whether such shifts are related to species traits. Using abundance data, we show a clear pattern of uphill shift in the mean altitude of bird abundance across the Scandinavian mountains, with an average speed of 0.9 m per year. Out of 76 species, seven shifted significantly their abundance uphill. Altitudinal shift was strongly related to species' longevity: short-lived species showed more pronounced uphill shifts in abundance than long-lived species. The observed abundance shifts suggest that uphill shifts are not only driven by a small number of individuals at the range boundaries, but the overall bird abundances are on the move. Overall, the results underscore the wide-ranging impact of climate change and the potential vulnerability of species with slow life histories, as they appear less able to timely respond to rapidly changing climatic conditions.

[cancelled]

Trends of numerous passerine birds in the forest zone of European Russia from the second half of 20th century till nowadays

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For comparison, 30 passerine species were selected, which were leading in number in the second half of the 20th century. These species accounted for about 70% of all breeding bird numbers in the forest zone (E.S. Ravkin and Yu.S. Ravkin 2005). The comparison was spent according to the route census data on 10 pilot areas located in northern and central regions of European Russia. We used our own data, materials from the Zoological Monitoring Data Bank of the Biological Institute of the SB RAS (early 1960s to 1990s), as well as published information. The comparison of the species numbers calculated for the entire territory of the forest zone according to the data of censuses in the second half of the 20th century, and the numbers obtained for of the Atlas of Breeding Birds covering the period from 2005 to 2018 is also performed. Expressed decrease in numbers was noted for 6 species: Willow Warbler *Phylloscopus trochilus*, Willow Tit *Poecile montanus*, Redwing *Turdus iliacus*, Goldcrest *Regulus regulus*, Rustic Bunting *Emberiza rustica*, Crested Tit *Lophophanes cristatus*. For another 7 species, the decrease is less pronounced or likely: Tree Pipit *Anthus trivialis*, Common Chiffchaff *Phylloscopus collybita*, Brambling *Fringilla montifringilla* and several others. Stable numbers were recorded for 11 species: Common Chaffinch *Fringilla coelebs*, Greenish Warbler *Phylloscopus trochiloides*, European Robin *Erithacus rubecula* and several others. Signs of growth were noted for 4 species: Great Tit *Parus major*, Song Thrush *Turdus philomelos*, Eurasian Blackcap *Sylvia atricapilla*, Common Whitethroat *Sylvia*

communis. The total number of the considered species in the forest zone of European Russia 40 years ago was estimated at about 370 million conditional pairs; currently – about 225 million. Taking into account the differences in the census methods, it can be concluded that the total number of the most widespread forest bird species has decreased by 20–30% over 40 years.

10:00–10:45 Seminar Hall

Demographic and population monitoring

Modular and mobile – the future of goose and swan monitoring in Germany

Johannes Wahl[1], Rainer Dröschmeister[2], Thomas Heinicke[3], Jakob Katzenberger[1], Helmut Kruckenberg[4], Nikolas Prior[1], Kees Koffijberg[1]

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Germany harbours increasing numbers of migratory goose and swan species. So far, trends and population estimates have been determined by using monthly counts throughout winter. While this setup allows assessment of trends for most species, estimates of total abundance for the various international conventions and treaties (e.g. Birds directive reporting) have proven to be difficult, as coverage was often regarded insufficient.

The new concept separates between monitoring counts to calculate trends and dedicated surveys to estimate total abundance. Trends will be based on monthly or bi-monthly counts from September to May, thus largely using the existing count networks. Power analyses were used to define a minimum set of selected census areas needed to guarantee for reliable trend estimates.

In addition, dedicated national counts for specific species will be organised once every 3–6 years to allow estimates of total abundance. Such species-specific counts have proven to be attractive for a wider audience of volunteers, comparable to the international swan counts carried out once every five years. Counts will take place in January and additionally, if the maximum is reached during migration, on the established international goose counts in September, November, March and May. Furthermore we aim to establish a specific survey of temperate-breeding geese in July.

Several count programmes will contribute to the monitoring of geese and swans. Data flow will be largely digital and follows fixed protocols. Field data is preferably collected by the NaturaList app or via specific tools in ornitho.de. A new national database will include tools and routines for regional co-ordinators and provide possibilities for automatically generated feedback. This new concept could be a blueprint for those countries struggling to organise monthly counts with full coverage but aiming to extend their network for achieving estimates of total abundance in goose and swan species.

Breeding success monitoring in arctic- and temperate-breeding goose and swan species

Kees Koffijberg[1,2]

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Many goose and swan species breed in remote arctic breeding areas and winter in large flocks in wetland and farmland areas in NW-European countries. Especially in The Netherlands, assessing productivity among those flocks has had a long tradition, going back to the early 1960s. Plumage characteristics and social behaviour of individual birds in wintering flocks make it possible to assess breeding success of high arctic species during autumn and early winter. Such demographic rates have become

increasingly important in understanding the observed population dynamics and forecasting future developments or assessing the impact of management measures, e.g. in the framework of the recently established European Goose Management Platform under the African-Eurasian Waterbird Agreement (AEWA).

Collection of field data in The Netherlands is part of the national waterbird scheme, but as non-successful breeders may distribute differently in winter compared to successful breeders (and this may be due to changes in time), representative samples can only be taken when done at larger scale in more countries. The presentation will address some methodological issues and make proposals for standardized data collection. As data can be collected beyond the regular census schemes, submission via the available citizen-science portals will be of great benefit.

Data collected in The Netherlands and Germany show that a number of species has experienced declines in productivity in the past two decades. Results of additional species-specific research will be used to highlight some case studies in which the indicator value of reproductive rates is shown.

Involving citizens in demographic monitoring: the declining Dutch Mallard population as an example

Chris van Turnhout, Erik Kleyheeg, Loes van den Bremer

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Volunteers play an indispensable role in the long-term monitoring of bird population abundance and distribution across the world. Assessing changes in vital rates is often regarded as the next, crucial step in elucidating the possible drivers of the population changes observed, which is needed to ultimately formulate effective conservation and management strategies. In this contribution we show how both dedicated volunteers and the general public can be involved in studies of reproduction and survival, by either participating in generic programs or targeted projects. We use our recent exploration of the mechanisms underpinning the declining breeding population of the Mallard (*Anas platyrhynchos*) in the Netherlands as an example. Analyses of long-term ringing recovery data and nest records, both collected by very different groups of dedicated volunteers, did not indicate declines in survival and nest success, respectively. Subsequently, we launched a citizen science 'Duckling project' in 2016 to collect data on females with broods, in order to assess duckling survival. A customized mobile app was developed to submit observations of Mallard broods (kuikenteller.org), including information on brood size and age, location and several habitat variables. Over the course of five years, 24,000 observations of Mallard broods were collected, of which over 1,200 concerned follow-up observations of (probably) the same family. These data were used to estimate the survival rates of Mallard ducklings until fledging, which amounts to 13–24%. Our findings were compared with Mallard duckling survival data from literature, and with simultaneously collected data for ecologically related species, Gadwall *Mareca strepera* and feral Mallards *Anas platyrhynchos* forma *domestica*. Possibilities, limitations and the broader applicability of this citizen science approach in bird population demography will be discussed.

[cancelled]

Monitoring vital rates of the declining Dutch Oystercatcher population with citizen science

Bruno Johan Ens

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The population of Eurasian Oystercatchers *Haematopus ostralegus* breeding and wintering in the Netherlands started to decline around 1990 at an alarming annual rate of 5%. To draw attention to this decline and investigate the causes, Sovon and BirdLife Netherlands proclaimed 2008 as the "Year of the Oystercatcher". It was clear from the start that the population occupied a variety of breeding habitats (agricultural land, saltmarshes, artificial coasts, and urban areas) and wintering areas (Wadden Sea, Eastern Scheldt, Western Scheldt), and encountered a multitude of threats in each of these habitats and areas. It was decided to build a citizen science network to individually colourmark Oystercatchers in different areas and stimulate ring reading by developing a website where observations could be

entered, yielding the life history. The website recently migrated to https://submit.cr-birding.org/ and in the meantime Mario Huizinga developed a mobile app https://birdring.nl/ to enter observations and obtain the life history in the field.

Oystercatchers breeding in the North of the Netherlands mainly winter in the Wadden Sea, whereas Oystercatchers breeding in the South mainly winter in the Eastern Scheldt, where the storm surge barrier is responsible for a continuous decline of intertidal mudflats, or further south in France, where they may be shot by hunters. Saltmarsh breeding Oystercatchers suffer from an increased risk of flooding due to an increase in the frequency of summer storms. Inland breeding Oystercatchers, comprising the bulk of the population, suffer from agricultural intensification and an increase in the risk of predation. The only segment of the population doing well are the small number of roof-breeding urban Oystercatchers. Especially in the east of the Netherlands, urban Oystercatchers fledge more than enough young to sustain the population, causing the local number of breeding pairs to increase. We are currently working on a migratory network population model to assess the relative importance and cumulative impact of these human impacts.

11:30–12:30 Conference Hall

Population monitoring 1

Monitoring quantity and quality of bird feeding and factors affecting to the feeding

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Feeding of birds is a common habit in many European and North American countries especially during winter. Earlier studies have shown that supplementary feeding can have both positive and negative impacts on species influencing e.g. survival and reproduction of birds. However, potential changes in quantity and quality of feeding and factors affecting this have rarely been investigated even though feeding can have large scale impacts on species' populations. We were interested in investigating (i) has feeding intensity changed in the long-term and are there spatial differences in patterns for instance between urban and rural areas?, (ii) has the quality of the provided food changed in time?, and (iii) what factors may have caused potential changes in the feeding activity? Here we present combined information from winter bird counts, winter feeding monitoring and statistics of food and safety authorities to investigate temporal changes in feeding behaviour of people in Finland. In addition, we conducted an online questionnaire for over 14,000 bird feeding people to understand the reasons for these changes. Our preliminary results indicate that the amount of feeding sites has decreased during 1987–2020 especially in urban areas. The quality of the food has changed considerably: the amount of sunflower seeds, fat and peanuts has increased whereas provision of cereal has decreased. Presence of rats and regulations by the authorities and housing associations seem to be the main reasons in the urban areas why people have stopped feeding. We argue that supplementary feeding of animals should also be monitored and potential ecological consequences of feeding need to be studied in more detail.

European Raptor Monitoring Facility – monitoring raptors for exposure to toxic substances and biological impact

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Toxic substances, many persistent and bio-accumulative, continue to enter natural ecosystems through deliberate means or as pollutants. As long-lived apex predators and scavengers, and still poisoned, raptors are particularly vulnerable to exposure, exhibit observable individual effects and show negative impact at the population level through reduced productivity or increased mortality. The European Raptor Biomonitoring Facility (ERBF) is a COST-funded initiative involving raptor field researchers, ecotoxicologists and curators. Its aim is to develop a coordinated raptor monitoring network to facilitate the use of biological material, mainly from raptors found dead. It encompasses chemical analyses, storage and transport of samples from specimen banks and natural history museums, and collection of appropriate contextual field data. An online advice hub will provide guidance on raptor ecology, necropsies, sampling, storage and analytical protocols as well as participating laboratories. Mainly through internships, ERBF has reviewed European capacity from the field to chemical analyses and identified key barriers. The Field Arena work area focuses on increasing capacity of existing raptor monitoring and field studies to collect relevant ecological information as well as to fill gaps through non-lethal sampling. Proofs of concept are being developed using the Tawny Owl (*Strix aluco*) or Eurasian Buzzard (*Buteo buteo*) to test the capacity of ERBF to assess spatial variation in substances such as anticoagulant rodenticides and heavy metals.

There is considerable potential for the dispersed facility developed by ERBF to link more closely with EBCC terrestrial bird monitoring, as well as local raptor studies. These are already used to identify population changes, but greater communication between these networks could enhance the collection, value and use of ecological data to assess the impact of contaminants. Overall, this will contribute to European environmental policies on pollutants and other toxic substances, ultimately reducing risks to raptors and wider biodiversity.

Dabbling ducks in Denmark 1965–2021: the ups and downs of half a century of monitoring their abundance in a changing waterscape

Preben Clausen, Thomas Bregnballe, Kevin Kuhlmann Clausen, Anthony David Fox, Rasmus Due Nielsen, Marie Silberling Vissing

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Flocks of dabbling ducks are a characteristic feature of many wetlands in Denmark. Although counts have been more constant and comprehensive at some sites than at others, the abundance and distribution of Danish dabbling ducks has been monitored in 57 years, with regular countrywide count campaigns especially during midwinter and autumn. In the same timeframe, both protection and site management for these popular quarry species have improved immensely. The first, and probably most important change in the waterscape for ducks, was the doubling of both the number and area of shooting-free reserves, implemented during 1994–2000. Secondly, a series of countrywide nature restoration projects completed during 1998–2018 restored five large wetlands (>40 km^2 in total!), as well as numerous smaller ones, that formerly were areas of drained agriculture or peatland. While ducks at these sites benefitted from these initiatives, other sites have suffered from loss of submerged aquatic vegetation, driven by eutrophication, leaving previously internationally important sites almost devoid of dabbling ducks at present. Fortunately, improvements to water quality and self-restored seagrass beds are now bringing thousands of ducks back in two major sites. Here, we review the responses of dabbling ducks to these environmental changes. Since the 1960s, numbers of Mallard *Anas platyrhynchos* in autumn may have declined, but wintering abundance remains stable. Autumn Wigeon *Mareca penelope* numbers have at least doubled, although subject to major redistribution since the 1980s. Pintail *Anas acuta* and Common Teal *Anas crecca* have shown more modest increases in autumn, but both after lower numbers during the 1980s. In the 1960s, the Gadwall *Mareca strepera* was very rare and restricted to southeastern Denmark, but is now found countrywide, numbering at least 4,000 birds. Wigeon, Pintail, Teal and Gadwall have all increased in wintering abundance, due to increased frequency of milder

winters. Although few Northern Shoveler *Spatula clypeata* winter in Denmark, their autumn numbers remain stable, but their distribution has also changed.

[cancelled]

Increasing of wintering waterfowl populations in the northwestern Caucasus

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We present the results from IWC 2003–2021 in Krasnodar and Adygeya regions, SW Russia in relation to swans, geese, ducks and Common Coot *Fulica atra*. Midwinter counts were conducted annually except for 2007–2009. The coverage varied from five sites in 2012 to 27 sites in 2004, being dependent mostly on the available funds and freezing conditions of wetlands. Altogether, 39 sites were visited at least once. We compared the average (per one season) counts of each species group over the first three years (2003–2005) and the last three years (2019–-2021). Wintering populations of swans, geese and ducks increased dramatically: swans from 2,477 to 24,557 individuals (9.9 times), geese from 4,268 to 24,144 (5.7 times), and ducks from 148,341 to 1,151,051 individuals (7.8 times). Coot number has grown from 18,342 to 43,042 birds (2.3 times). Among individual species, Mute Swan *Cygnus* olor, Whooper Swan *C. cygnus*, Greylag Goose *Anser anser*, Common Shelduck *Tadorna tadorna*, Mallard *Anas platyrhynchos*, Tufted Duck *Aythya fuligula* and Common Pochard *Aythya ferina* demonstrated the most obvious population growth. Trends, influences of natural and man-made factors, as well as conservation implication of the study will be further reported and discussed in the presentation.

11:30–12:30 Seminar Hall

Conservation 1

Integrating biodiversity conservation issues in water management strategies: the consequences of dam development on the conservation of wintering waterbirds in the Mediterranean region

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The conservation of Mediterranean natural wetlands is of major concern, as they support more than 30% of vertebrate species of this region and half of their area has been removed in the last century. One of the main pressures on these ecosystems, alongside climate change, urbanisation and agriculture, is the construction of dams, which threatens downstream wetlands and their associated biodiversity. Although the impact of damming on downstream waterbird communities has been investigated and many dam construction projects are planned, little is known about the ecological role and conservation value of dam reservoirs for waterbirds. Here, we assess whether wintering waterbird communities of dam reservoirs differ from those of other wetlands in Mediterranean countries. To this end, we combined an unprecedentedly comprehensive database of Mediterranean dams (34,516 dam reservoirs in 22 countries) with data from the International Waterbird Census. We then evaluated the dissimilarities in species and functional composition between waterbird communities within dam reservoirs (465 sites) and other waterbird communities (3,255 sites) by performing a Canonical Correspondence Analysis

(CCA) and a Permutational Multivariate Analysis of Variance (PERMANOVA). As expected, we found that both species and functional group abundances of wintering waterbirds differed between dam reservoirs and other wetlands. Diving ducks and diving fishers were most associated with dam reservoirs, whereas wading birds were more abundant in other wetlands. We also showed that the use of dam reservoirs varied with climate for several functional groups. Finally, we highlighted the importance of dam reservoirs for some species of conservation concern such as *Oxyura leucocephala* and *Vanellus vanellus*. In this context of global changes and dam development, we emphasise the urgent need to protect and restore natural wetlands, which are most suitable for many waterbird species. However, we also encourage the protection of dam reservoirs of importance for waterbirds.

Gaps in the Mediterranean Ramsar network

Nadège Popoff[1,2], Elie Gaget[2,3,4], Arnaud Béchet[2], Laura Dami[2], Pierre Defos du Rau[5], Ilse Geijzendorffer[2], Anis Guelmami[2], Jean-Yves Mondain-Monval[5], Christian Perennou[2], Marie Suet[2], Fabien Verniest[2,3], Clémence Deschamps[2], Nigel G. Taylor[2], Hichem Azafzaf[6], Nadjiba Bendjedda[7], Taulant Bino[8], John J. Borg[9], Luka Božic[10], Mohamed Dakki[11], Vitor Encarnação[12], Kiraz Erciyas-Yavuz[13], Khaled Etayeb[14], Clemence Gaudard[15], Ohad Hatzofe[16], Tom Langendoen[17], Christina Ieronymidou[18], Tibor Mikuska[19], Blas Molina[20], Nikolai Petkov[21], Danae Portolou[22], Tareq Qaneer[23], Samir Sayoud[7], Marko Šćiban[24], Goran Topić[25], Danka Uzunova[26], Gal Vine[23], Andrej Vizi[27], Marco Zenatello[28], Wed Abdou[29], Thomas Galewski[2]

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Protected areas are the cornerstone of biodiversity conservation to protect species and habitats. By 2030, we will have to protect 30% of the terrestrial surface to achieve the new target of the Post-2020 Biodiversity Framework (Convention on Biological Diversity). The Mediterranean Basin is a biodiversity hotspot shared between countries with different socio-economical levels and conservation policies, challenging the establishment of a coherent network of protected areas.

Here, we investigated the protection gap in the Mediterranean Basin, focusing on the Ramsar network, the international convention for wetland conservation, using a coherent waterbird monitoring framework. The International Waterbird Census is one of the main sources of long-term information used by the Ramsar Convention to identify and protect wetlands of international importance for birds, strengthened here by the regional Mediterranean Waterbirds Network and efforts from national coordinators.

We assessed the extent to which the current Mediterranean Ramsar network includes wetlands of international importance for wintering waterbirds using the Ramsar Convention criteria 2 (species of conservation concern), 5 (> 20,000 waterbirds) and 6 (1% of a population). These criteria were applied to 4,186 sites with abundance time series for 145 waterbird species from 1991–2017 in 24 Mediterranean countries. We identified 161 sites of international importance for waterbirds which could be added to the current 180 Ramsar sites already designated for their importance for waterbird conservation. Among these sites, a subset of 32 very important sites reached double the required level for at least one criterion. Coastal wetlands represented half of the Ramsar gap for waterbirds. We also identified 1,218 sites of potential international importance, requiring more survey efforts to assess their status.

Our results should help policymakers and managers to prioritize future Ramsar site designation, notably in the Middle East and Western European regions where important gaps were identified.

Climate change and challenges in migratory geese status and population assessments – the case of the Red-breasted Goose

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Human-induced changes of Environment and Global warming alter bird migration timing and routes. The delays and shifts in waterfowl migration have been widely reported and this leads to changes in monitoring effectiveness. Increased uncertainty leads to challenges to population and conservation status assessments. Assessing correctly the population status of species and having accurate data on the distribution and timing of the migratory species is crucial for planning appropriate conservation measures.

Red-breasted Goose *Branta ruficollis* breeds in the Arctic of Russia and winters in SE Europe. Its population size and status assessment were based on direct winter roost counts till early 2000s. Since then, indications for either short stopping along the migration route or population decline has been observed and the species has been uplisted to Endangered IUCN status due to presumed population decline by over 50%.

With uncertainty about the decline and population size, focus for surveys was shifted from wintering areas to the autumn staging period, as the whole world population migrates through northern Kazakhstan on the way south after the breeding period. The counts there are based on different methodology and approach, with sampling and extrapolation opposed to the direct counts in the winter grounds. The autumn monitoring has produced variable data and some large population figures uncorroborated by winter counts. Despite use of data from satellite tagged birds, the field teams in winter have failed to locate a major part of the population despite coordinated efforts. Since 2016 an international collaboration has worked to improve autumn count methodology in order to produce more precise data on all populations of the migratory geese in Kazakhstan.

Here we present challenges for status assessment of the species, based on the gathered data in light of the differences in the methodologies of the two monitoring schemes and why global trend remains unclear and problematic. Recently adopted flyway monitoring protocol provides basis for future improvements.

Bird research within the project “Polesia – wilderness without borders”

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Transboundary project “Polesia – wilderness without borders: protecting one of Europe’s largest natural landscapes” has started in 2019 and will last for 5 years. Main project aim is connectivity and biodiversity conservation are effectively secured in one of the largest natural landscapes in the heart of Europe allowing natural processes to determine the ecology and shape of the landscape; the local economy moves towards being based on sensitive and sustainable management of natural resources. There are many different project tasks among which are expansion of PA, improvement of PA management, restoration of drained mires, increase of awareness and knowledge, development of alternative livelihoods, but they all need actual and accurate data on key bird species distribution and abundance. During 2019–2020 special surveys were made in order to identify important areas for breeding and migration of birds, to identify the threats for bird populations and to develop special management plans for PAs. As a result, 119 breeding points of Common Crane were found, for most important of identified locations a package of documents for creation of new protected areas were prepared. 50 breeding points of rare owl species were identified, and the protected zones were created around the nests of Pygmy Owl,

Eagle Owl, Great Grey Owl and Tengmalm's Owl. Key areas for bird migration were considered as of important directions, but the main hotspots are located on the territory of Belarus – thousands of waders stop there during spring migration.

14:15–15:30 Conference Hall

Population monitoring 2

SEGRE: A new project to monitor forest-dwelling raptors in Catalonia. A methodological approach

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Although raptors have traditionally attracted great interest due to the strong population declines suffered over the 20th century in Europe, forest-dwelling species have often been poorly monitored so far. The lack of a standard monitoring methodology for this group of species poses problems in official communication processes of the state of populations, such as the Article 12 of the Birds Directive and Natura 2000 reporting by EU member states. In Catalonia, in contrast to scarce cliff-breeding raptors, data on forest-dwelling raptors has been decentralized, scattered, and collected with different methods. Consequently, a new standardized long-term monitoring scheme – the SEGRE project – was launched based on previous experiences from both the study area and other European countries. The SEGRE project coordinates precise information collection of breeding territories and nest sites of raptors in protected areas. This necessary population data aims to accurately inform on the status of forest-dwelling raptors within each protected area and to determine the distribution and population trends of forest-dwelling raptors in Catalonia. The defined methodology consists of four-morning visits from a fixed viewpoint with good visibility within a reference 2.5 × 2.5 km square. The visits cover the whole breeding season of the target species between March and July and, in order to do a territory mapping, each raptor observation is geo-located together with a behavioural code that facilitates determining the breeding status. The first results of the project after the three-year pilot period in 12 protected areas are very promising. The project covered the existing previous knowledge gap of this group of species and collected accurate information for nine forest-dwelling species out of the 22 species of raptors that breed in Catalonia. As a result, in the field season of 2022, the project will be expanded to other protected areas to increase its territorial coverage.

Phenological mismatch between breeding birds and their surveyors. Do we need to worry (yet)?

Dario Massimino, Sarah J Harris, Simon Gillings

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Monitoring of common breeding birds often involves surveyors visiting selected locations twice per year, with interannual differences in the number of birds detected used to infer population trends. Two processes, bird phenological changes in response to climate change, and changes in the survey dates, may cause variation in the number of birds detected, leading to biases in inferred population trends. We assessed the magnitude of potential biases using the UK Breeding Bird Survey (BBS), comparing survey dates, species phenologies and apparent trend biases between 1994–1998 and 2013–2017 in South-East England, a region with spatially homogenous climate and well covered by the BBS. Survey dates became significantly earlier, advancing by 2–4 days on average. We calculated seasonal patterns of bird detections for 68 species. After standardising these to remove long-term abundance trends,

median detection dates were advanced by 0.82 days on average. At the species level, the majority of changes were small (within ± 2 days) and only five species showed a statistically significant advancement in median detection date. However, species' phenological changes alone are capable of inducing between an 8% suppression and 21% enhancement of species' trends, although the majority are much smaller (± 2%). Effects of a similar magnitude are apparent if changes in survey dates are also considered, although different species are affected. Small modifications to the statistical model used to estimate the trends can control for changes in survey timing, but without additional survey visits, or using data from other sources, we cannot currently control for seasonal variation in detectability. Although the average effects shown here are small, biases could become increasingly important for some species, therefore we recommend organisers of biodiversity monitoring schemes assess whether their methods are resistant to variations in species phenology and survey timing.

Impacts of COVID-19 restrictions on the UK's Breeding Bird Survey

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An investigation was required to learn about the effect that COVID-19 'lockdowns' and travel restrictions had on participation in and coverage by the BTO/JNCC/RSPB Breeding Bird Survey (BBS) volunteers, and to quantify the likely impacts on population change reporting based on 2020 data.

We determined geographic, seasonal and habitat coverage for the BBS in 2020 and compared this to previous years, and quantified the scale of biases and reductions in sample size for target species. We degraded existing BBS data (1994–2019) to simulate 2020 coverage and produced population change estimates using three methods to the complete and degraded data to assess the impacts of 2020 coverage on emergent trends. This approach provides a good way of testing whether any future restriction to access or coverage has a meaningful impact on the resulting data from schemes, and therefore is more widely applicable than just to COVID-19.

As a result, we found that COVID-19 restrictions significantly biased coverage across the UK allowing indicative trends to be produced for approximately one third of species in England only.

Further considerations were also necessary to ensure continued interest and engagement with the BBS volunteers after many were unable to take part in 2020 and in some cases, 2021 as well. This was essential in order to maintain the connection with volunteers, without whom the survey would not be possible, and feed their interest in the importance of their efforts without the usual suite of population trend results in 2020.

German Common Breeding Bird Survey goes mobile and digital – lessons learned during the transition from a paper-only monitoring programme

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The German Common Breeding Bird Survey (CBBS) covers 100 species, 36 of them used in the national biodiversity indicator "Species Diversity and Landscape Quality" and 88 used in the "Temperature index of the bird community". Furthermore, it forms the basis for calculating biodiversity indicators at federal state level. The CBBS uses a simplified territory mapping method. Data are collated in a highly standardized way, with strong emphasis on quality control. However, both the timely provision of trend data to inform stakeholders and conduct causal analyses until recently were hampered by the lack of readily available spatially explicit data. This triggered projects funded by the German Ministry for Environment for a transition towards the digitization of the CBBS. The aims were to 1) facilitate both data collection and analysis, 2) standardize and accelerate data delivery and analysis, 3) provide digital raw data for causal analyses.

In 2020, an extension of the app NaturaList was introduced to enable data recording directly in the field. For volunteers who prefer recording on paper maps, an easy post hoc digitization tool, originally developed by the Swiss Ornithological Institute, was implemented in our national data management system dbird in 2021. Additionally, data analysis will be further automated.

Several aspects will be investigated during the transition, especially changes in detectability, survey effort, and surveyor behaviour. The process of digitization was accompanied by questionnaires. The first results are promising: User satisfaction and fidelity to the digital tools are high. Potential impacts on annual indices are currently being analysed. In the talk we want to share our experiences of going digital with a complex monitoring protocol, where digital data recording can have an impact on comparability of results and further steps need to be taken to encourage participants to embark on the digital journey in the coming years.

Monitoring of bird population changes by various monitoring schemes in Latvia – do the trends match?

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We compare trends of various bird species obtained in Latvia by (1) breeding bird monitoring surveys, by (2) nocturnal bird monitoring surveys, by (3) captures of birds during autumn migration in Pape, Latvia, and (4) data obtained in four data collection events for breeding bird atlases in Latvia (1980–1984; 1985–1989; 2000–2004; 2013–2017). Some species do show the same trend in all schemes like the Eurasian Blackbird *Turdus merula* and the Common Redstart *Phoenicurus phoenicurus* – increasing trend and the Redwing *Turdus iliacus* – decreasing trend, which correspond to the global population trend reported by IUCN and European trends reported by BirdLife International. The Blackbird range in Latvia as reported by atlases does not expand any more, but the population numbers increase according to breeding bird survey data. Some other species show conflicting trends – like for Great Spotted Woodpecker *Dendrocopos major* – breeding bird survey trend in Latvia is decreasing (as well as European trend reported by BirdLife International), while trend of migrating birds in Pape is stable. This might show problems in Latvian forests, since the trend reported by IUCN is increasing and the migratory bird trend recorded at Pape is representing more than just Latvian population, but also populations of Northern Russia.

14:15–15:30 Seminar Hall

Conservation 2

The Natura 2000 network contribution to breeding bird trends at the regional level in relation to land cover type

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Birds have recently shown worrying declining trends, despite the efforts of conservation through the implementation of the Birds Directive and the Natura 2000 network. To assess the potential contribution of Natura 2000 conservation measures, we modelled bird trends in the period 2000–2015 and the effects of Natura 2000 protection, across land cover classes, on regional abundances and local species

richness and diversity. We selected as a study site the Veneto Region, among the richest in bird species in Italy, particularly on the Alps and in the Venice lagoon. Bird data were derived from the national breeding bird monitoring scheme. Breeding birds showed declining trends at the regional level, confirming national and continental trends, particularly in agricultural and semi-natural areas. The land cover class, rather than Natura 2000, mostly influenced population trends; however, it was possible to observe slightly higher estimates of species richness and diversity in Natura 2000 sites. Despite the absolute higher estimates over the investigated period, farmland and woodland bird species had steeper declining trends inside Natura 2000 than outside. From our results, we can conclude that the Natura 2000 network capacity to buffer biodiversity loss and act as a species-pool for non-protected areas might be decreasing over time, mainly with regards to farmland and woodland birds. Natura 2000 implementation must be improved: management, monitoring and conservation measures should be better integrated into existing plans and funding should be made more efficiently available for Natura 2000 related expenditures. We suggest that similar assessments may help the improvement process, given that they these are replicable to other regions and areas of study.

Do protected areas work as ´safe havens´ for avian communities in a warming climate?

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Climate change and intensive land-use are significant drivers for loss of global biodiversity. Conservation biology relies heavily on protected areas but their role and effectiveness under warming climate is still debated. The static protected areas cover a limited amount of land while species' distributions are dynamic. We aimed to estimate the climate-driven avian community changes inside and outside of protected areas. We predicted that communities inside protected areas include higher proportion of northern cold-dwelling species than communities outside protected areas. Secondly, we expected the community change towards dominance of warm-dwelling species to be slower inside protected areas. Based on these predictions, protected areas could work as ´safe havens´ for northern, cold-dwelling species.

To study community changes we used large-scale North American breeding bird survey data from Canada during 1997–2018. We calculated community temperature index (CTI) annually for each bird community inside and outside protected areas. CTI describes the temperature preference of a community, a higher CTI value represents a community dominated by warm-dwelling species compared with those dominated by cold-dwelling species. We modelled changes of CTI in relation to e.g. protection status of the census site and year using linear mixed effect models.

Our results showed that CTI is lower inside protected areas. However, against hypothesis, CTI increased slightly faster inside protected areas compared to outside areas. These results highlight the ubiquitous impacts of climate change. Nevertheless, protected areas can aid cold-dwelling species by providing suitable habitats in a warming climate and therefore, act as havens for northern bird communities.

Conservation for improving bird responses to climate change

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Climate warming is one of the most challenging issues for biodiversity conservation, requiring increased management efforts to mitigate its negative impacts. Increasing landscape connectivity is one way to enable species range expansions in response to climate warming. However, these efforts are mostly irrelevant for species with high dispersal capacities like birds, for which an abundant literature still demonstrate a lag in their response to climate warming. Here I show, based on two case studies, the importance of protected areas to facilitate wintering waterbird responses to climate warming. At the European scale, I analyse abundance data collected from the International Waterbird Census for 97 wintering waterbird species gathered at 3,018 Natura 2000 sites from 1993–2017. I show that only some

of the management efforts that are part of Natura 2000 facilitated community adjustment to climate warming. At the local scale, I use information from almost one thousand surveys conducted since 1979 at the Tour du Valat (Camargue, France) for 39 wintering waterbird species. I illustrate how 40 years of water management practices influenced species abundance changes according to temperature increase. The statistical framework involves the concept of Community Temperature Index, hierarchical and joint species distribution models. These two case studies highlight that site conservation targets and conservation measures are important predictor of waterbird abundance changes in response to climate warming. Future climate adaptation strategies need coherent conservation efforts, including management efforts with documented success, to improve bird responses to climate warming.

Areas of High Conservation Value support more specialist forest birds

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Recently, the risk of biodiversity loss in European forests as a result of increased management intensity has come into focus, with current protected areas deemed insufficient to ensure biodiversity conservation. In many countries, protected areas are therefore complemented with so-called Areas of High Conservation Value (AHCV), landscapes encompassing protected and valuable areas as well as their surroundings, where increased attention to biodiversity should be paid. However, these AHCVs are often based on previously designated protected and valuable areas and therefore it is unclear if they are inhabited by the species that they are intended for.

We investigated if forest landscapes proposed as AHCVs in Sweden contain higher avian biodiversity than forest areas outside them, and in particular, if forest specialists and threatened species that may suffer from increased forest management occur more frequently and abundantly in these areas. To allow prediction of the fate of individual species, including rare ones, we fitted a joint species distribution model to bird count data for 70 forest species along line transects. We used the model to estimate the occurrence and abundance of the species inside and outside AHCVs.

Thirteen (65%) of the forest specialists were significantly more likely and none were significantly less likely to occur inside AHCVs. We did not find a consistent pattern in the generalist species. Six (40%) of the red-listed species were also more likely to occur inside AHCVs while two (13%) red-listed species were less likely to occur inside forest AHCVs. We found no consistent relation between AHCVs and species abundance.

The higher occurrence of specialists and threatened species inside AHCVs than outside strongly suggests that AHCVs are important for a considerable part of the forest avifauna in Sweden. Therefore, we argue that AHCVs present a clear opportunity for designing future conservation infrastructure in Sweden.

Changes in the numbers of common breeding birds within and outside protected areas in Poland

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Protected areas are expected to mitigate the biodiversity and climate crisis. The 2030 EU Biodiversity Strategy aims that protected areas will be an important tool of conservation in the next 10 years on an EU scale. The strategy calls for 30% of the land within the EU to be protected, including 10% under strict protection.

Although protected areas are mostly designated for specific species they have a positive effect on the abundance of non-targeted bird species.

We used data from the Common Breeding Survey, Poland's largest and longest-running citizen science project on birds, to investigate the effect of protected areas on abundance trends of the 100 most common breeding bird species in Poland. We used linear models and we controlled the other important factors influencing bird trends in Poland like forest area, latitude, and longitude. Results will be presented and discussed in context effectiveness of protected areas in bird conservation.

16:15–17:00 Conference Hall

Population monitoring 3

Spatial and temporal variations in the main causes of mortality in the Bearded Vulture: implications for the conservation of European populations

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The Bearded Vulture *Gypaetus barbatus* population has increased in size over the last decades in Europe, following conservation actions and reintroduction efforts. In fact, the return of the Bearded vulture in the Alps is often cited unanimously as a European conservation success. Yet, this positive trend remains fragile, as this long-lived species is particularly vulnerable to additional mortality linked to "novel" mortality causes (e.g. collision with wind turbines, surge in poison use linked to the return of large carnivores) or the resurgence of persecution in certain areas.

Here, we analysed the main causes of Bearded Vulture dropouts using a long-term and large-scale database from the reintroduction project in five European countries between 1987 and 2021 (n=120). We included mortalities as well as recaptures to account for all events. Further we analysed multiple factors leading to a dropout. We classified anthropogenic causes of mortality in four categories: i) collision (powerlines, cables, and wind turbines); ii) electrocution; iii) shooting and iv) poisoning (intentional; non-intentional: e.g. lead intoxication). In addition, we assessed the effects of sex, age and season on mortality patterns. We also aimed to identify potential spatial variations in mortality causes (between countries or populations). Finally, we compared our results with those obtained in a study published 13 years ago (Margalida et al. 2008) in order to identify temporal shifts in the main mortality factors over four different periods and depending on areas. Our results highlight spatial variations in the main mortality causes at the European scale and suggest a shift in the principal source of mortality over the last 10 years. We provide here a crucial update that will guide current conservation actions aimed at reducing mortality in Bearded vulture populations. This is key to strengthening the ongoing range expansion observed throughout Europe.

Monitoring the eastern Egyptian Vulture population by territory surveys and migration counts

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The eastern European population of Egyptian Vultures has declined dramatically since the 1980s, but recent intensive conservation management on the Balkan peninsula may slow the decline. In addition,

very little information is available about the size and trend of the Turkish population, which may act as a source population for the declining population on the Balkan peninsula. To monitor the impact and effectiveness of conservation actions we initiated population monitoring in five countries by combining territory surveys and migration counts. Since 2005, known Egyptian Vulture territories in Bulgaria, Greece, North Macedonia and Albania have been surveyed at least twice per breeding season to assess occupancy and infer the size and trend of the Balkan breeding population. Because the Turkish breeding population is much larger and more dispersed, we initiated a migration count in 2013 that aims to record all Egyptian Vultures leaving western Turkey in September. Our data indicate that the Balkan population declined from 205 territorial individuals (95% credible interval 191–224) in 2005 to 102 (95% CrI 90–117) territorial individuals in 2020. The mean annual population growth rate exceeded 1 for the first time between 2019 and 2020 (lambda = 1.002, 95% CrI 0.866–1.183), indicating that conservation management may start to halt the decline of the species. We recorded 813–903 Egyptian Vultures regularly migrating southwards through western Turkey in September. Thus, the population in western Turkey is likely >5-times larger than the Balkan population, and we encourage more monitoring and survey effort in Turkey to better understand population size and trends of this large population.

The Long-legged Buzzard *Buteo rufinus* in Cyprus: Three decades of presence and expansion on the island

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The Long-legged Buzzard (LLB) is a relatively new species on the island of Cyprus. The first confirmed nest was recorded in 1992 even though the species was probably overlooked. Its presence on the island coincided with its westward expansion to Eastern and Central Europe at the same period but could be also be attributed to climate change (Cyprus is becoming warmer and drier). Systematic monitoring for over two decades has revealed an expansion of the species from the western part of the island eastwards and northwards. In 2005, an island-wide survey estimated the population to 34 pairs whereas in 2012 the population expanded to 65 pairs and to 91 in 2017. The latest survey in 2021 showed the number of nesting pairs to have increased to more than the 100 pair. Nesting success was calculated for all survey years.

Analysis of pellets/prey remains indicates that the Black Rat *Rattus rattus* is the most common prey, followed by reptiles (Agama lizards *Stellagama stelio* and large whip snakes *Coluber jugularis*).

The LLB shares some nesting areas with the Bonelli's Eagle *Aquila fasciata*, a fairly common raptor and the only eagle that nests on the island. Even though the Bonelli's Eagle nests mostly on pine trees *Pinus brutia* and the LLB mostly on cliffs and to a lesser degree on trees, they share several areas for nesting and foraging. They also share some prey species such as rats and reptiles, even though the eagle feeds mostly on larger prey, such as medium sized birds and to a lesser degree on lizards.

The abundant rodent prey that dominates its diet and available nesting cliff sites due to the near extinction of the Raven *Corvus corax*, the Griffon Vulture *Gyps fulvus* and the preference of Bonelli's Eagle for mostly trees for nesting, could also be some conditions that facilitated its rapid expansion and establishment.

16:15–17:00 Seminar Hall

Conservation 3

Updating the European Red List of Birds: results and lessons from the latest assessment

Anna Staneva, Claire Rutherford, Ian Burfield

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In October 2021, BirdLife International published a revised edition of the European Red List of Birds, reassessing the regional extinction risk of all 544 species of birds in Europe by applying the IUCN Red List categories and criteria at regional level. The assessments were based primarily on population and trend data collected by thousands of fieldworkers from 54 countries and territories across Europe, either reported by EU Member States to the European Commission under Article 12 of the Birds Directive, or collated by national coordinators and reported to BirdLife.

At European level, 71 bird species (13%) are threatened, with 8 (2%) Critically Endangered, 15 (3%) Endangered and 48 (9%) Vulnerable. A further 35 species (6%) are Near Threatened, while five species are considered Regionally Extinct. Compared to the previous assessment in 2015, 84 species are classified differently, with 37 considered to have a higher extinction risk and 47 a lower risk. Many of these changes relate to genuine deterioration or improvement in species' populations, although some are artefactual, reflecting changes in the methods used for field surveys, population estimation or trend calculation.

Seabirds, wildfowl, waders and raptors have the highest proportions of threatened species per taxonomic group, along with smaller groups such as kingfishers, bustards and grebes. Over 40% of wildfowl and waders, and around 25% of seabirds and raptors, are experiencing population declines, as are one third of all migratory species. Farmland, grassland and marine habitats hold the highest numbers of threatened species.

Despite its exceptional history of data collection and environmental surveillance, Europe's knowledge base on birds still has room for improvement. Better cooperation between governments, organisations and institutions, as well as coordinated international efforts in research and bird monitoring, supported by more dedicated resources, are essential to successfully inform and address conservation priorities across the continent.

Changes in threatened birds of Switzerland according to three Red Lists (2001, 2010 and 2021) using IUCN guidelines

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In 2001, the first Red List of threatened breeding bird species in Switzerland was published according to the IUCN guidelines which focusses on the extinction risk in a given area. Since then, the Red List has been updated at 10-year intervals, so that three editions are available now. We now compared the three assessments. For that purpose, only those 193 species that have been assessed in all three lists were considered. The proportion of threatened species (RE, CR, EN, VU) remained quite stable from 2001 to 2021. But the proportion of Near Threatened species (NT) increased between 2001 and 2021. In parallel, the proportion of Least Concern species (LC) has decreased. The IUCN Red List Index (RLI) assesses the overall conservation status of a species set, including all Red List categories. The RLI shows a slightly negative trend of 3% from 2001 to 2021. The threat status of Switzerland's breeding birds has thus slightly increased. A critical aspect of the IUCN guidelines is that a slow population decline does not lead to the upgrading of a species on the Red List as long as the population is still large, even if this continues for several decades and the species has lost part of its range. However, measures for species conservation are more promising if they are taken at an early stage than if we wait until the

species appears on the Red List. For species conservation projects, therefore, the focus should not only lay on highly endangered species but also include additional information.

Living Planet Index for Catalonia: The role of monitoring data in the evaluation of the state of nature.

Marc Anton[1], Sergi Herrando[1,2], Lluís Brotons[1,2,3,4]

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In 2020 the first report on the state of nature in Catalonia was published. It quantifies changes in the state of biodiversity since the beginning of the 21st century, analyses its main drivers, describes the ongoing work aiming to reverse negative trends in certain species and habitats, and discusses Catalonia's responsibility in biodiversity conservation in the European and global context. A substantial part of the report is based in the results and interpretation of the Living Planet Index for Catalonia, a multi-species indicator made using the trends from monitoring schemes for a total of 321 species (153 birds, 18 mammals, 14 reptiles and amphibians, 9 freshwater fishes and 127 butterflies). The main conclusions were: 1) Over the last 20 years, the populations of vertebrate and invertebrate native species for which data is available have diminished by an average of 25%. 2) The decrease in population sizes was analysed by habitat type: a loss higher than 50% was observed for species living in rivers, lakes, and marshlands, a 30% decline for farmland and grassland species and 10% for forests and scrubland species, 3) for sea-dwelling species, available data also indicated an unfavourable situation. 4) Land use changes had the main negative impact on biodiversity loss, although climate change and the establishment of invasive species showed an increasing effect. 5) The underlying cause of all mentioned drivers is a socio-economic model leading to unequal resource extraction, with the intensification of some areas and the abandonment of others, which had been used more sustainably, 6) conservation measures have proved essential to reverse the negative trend among specific species, habitats, and sites of interest, but have not halted the general decline, and 7) in general, the problems of biodiversity conservation faced in Catalonia are similar to those in Europe as a whole.

Posters

Citizen science and capacity building

01

From birdwatching to bird counting – some best practices in capacity building from the Netherlands

Albert J. de Jong, Chris van Turnhout, Dirk T.K.G. Zoetebier, Gerard Troost

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During the Covid-19 pandemic a lot of people discovered the joy of nature for the first time. Despite regulations, many people in European countries started to walk, watch birds and became new naturalists. However, from being a bird watcher to becoming a skilled and dedicated bird counter is quite a step to take. For monitoring organizations like Sovon, the question is how to recruit, train, motivate and coach these novices.

In this contribution we share some experiences from capacity building over the last couple of years in The Netherlands. What did we learn? Initiated by Covid restrictions, we set up a series of webinars on YouTube with a small team of trainers, dealing with a variety of subjects in bird monitoring. Also online courses on other platforms gained popularity. However, organizing field courses remained the best way of practical learning. The use of tailored apps to submit data is still boosting as well. After all, do we see back our combined efforts in the participation by volunteers in monitoring programs? In order to keep track of this we put up a 'participation monitor', by which we follow the commitment and demography of the backbone of our organization: the volunteers.

02

Using citizen science to monitor bird populations in urban areas

Hany Alonso, Nuno Oliveira, Joaquim Teodósio, Joana Andrade, Alexandra Lopes

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Urban areas have been expanding worldwide, in opposition to many natural or semi-natural habitats. Some avian species may take some advantage of this emerging habitat, which sometimes may prove to be a safe nesting site or just open the door for new foraging opportunities. While this may be good news for a few native species which may face habitat loss and degradation in other areas, and may take an opportunity to thrive in the cities, urban areas can also be explored by exotic or even native "invasive" species. In this context, monitoring bird populations in urban areas is not only extremely important, for nature conservation and human wellbeing, but also highly challenging. First, most relevant sites (such as nesting sites) are not accessible or visible from any point. Secondly, the heterogeneity and extension of the urban habitat, makes it almost impossible to warrant an appropriate coverage of all potential areas of interest. In this presentation we will explain how citizen science can give us a hand in bird monitoring in urban areas, giving examples of a national: 1) urban gull census and 2) Rose-ringed Parakeet census, that took place in mainland Portugal in 2021. By incorporating a component of citizen science in these two monitoring programs, we were able to warrantee a good prospection/coverage of urban areas and collect bird count data, while still delivering good quality data. To do so, an important step was to find an easy way to check data quality and to integrate data collected by citizens with no experience in bird identification. Engaging citizens in this "environmental monitoring task" also demands a well-defined communication plan and the engagement of volunteers in all the steps of the process (data collection, dissemination of results, etc.), but is also a way of creating environmental awareness in the community. In conclusion, citizens gave us a significant and valuable help in the monitoring of urban gull and Rose-ringed Parakeet populations, enabling an update of the current status of these two species, which have been increasing in urban areas of Portugal.

03

Birds in education: innovative learning methods for capacity building in nature conservation

Inês Roque[1], Carlos Godinho[1], João Eduardo Rabaça[1,2], Shirley van der Horst[3], Akos Klein[4], Zoltan Schneider[4], Laszlo Patko[5], Dora Gigler[5], Alessia Portaccio[6], Thomas Campagnaro[6], Tommaso Sitzia[6], Davide Pettenella[6], Ellie Parker[7], Michael Singh[7], Simon Roper[7]

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The role of volunteer birdwatchers in bird censuses across the world is crucial to acquire data for science and conservation, and people with different skill specializations and motivations are engaged as citizen scientists. Bird species richness is positively related to life-satisfaction across Europe, while this association doesn't exist in other wildlife groups. Therefore, birds seem to be particularly captivating for recruiting people to environmental monitoring and nature conservation efforts.

The WildSkills EU Erasmus+ project identified a discrepancy at the European level between higher education training and the needs of the labour market in the field of environmental monitoring and nature conservation. To address this skills gap, a collaboration between professionals from European non-governmental organizations and higher education institutions was set up to develop innovative and accessible distance learning. The project will use a virtual learning environment that combines the use of physical equipment and tools with webinars and livestream technologies, and periods of transnational mobility, to provide, assess, accredit, and support the acquisition of new knowledge.

The Birds in Education course is part of the learning materials of the WildSkills EU project. This course will explore (1) the personal motivations for, and the implications to science and society, of our awareness of birds, (2) notions of bird conservation in the European context, (3) the basics of bird identification, (4) how to use birds as environmental education tools, and (5) digital tools for bird identification and citizen science. The course will be tested by higher education students from different backgrounds, aimed at developing skills for the nature conservation sector, and by professionals of the education sector. In the end, this course will contribute to capacity building and to citizen science and has the potential of increasing the public engagement in bird counts, which represents a growing need of many bird conservation organizations.

Bird distribution and atlas work

04

Second Bird Atlas in Bulgaria: methodology and results from a pilot year

Stoycho Stoychev[1], Georgi Popgeorgiev[1,2], Iordan Hristov[1], Mihail Iliev[1], Vladimir Mladenov[1], Irina Mateeva[1], Svilen Cheshmedjiev[1], Volen Arkumarev[1], Girgina Daskalova[1,2], Petar Shurulinkov[2]

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The First Bulgarian Breeding Bird Atlas was published in 2007 (Iankov 2007) based on data from the period 1996–2005. The data collection for the Second Atlas will be done in 2021–2025. It will cover both breeding and wintering period. The Second Atlas is based on UTM 10 × 10 km (MGRS) grid as the First Atlas in order to enable direct comparison of the distribution changes. The total number of 10 × 10 squares to be surveyed is 1,257, including 970 entirely on the territory of Bulgaria. The data are collected in the electronic data base smartbirds.org/. The observers that select squares to survey can see lists of species found in the same squares during the first Atlas, lists of species recorded by themselves

and lists of species found by other observers. Field data are collected by the electronic app SmartBirdsPro. The breeding bird methodology envisages: (1) Surveys of species abundance, which requires that in every 10 × 10 km square four plots 1 × 1 km are surveyed for one hour twice during the same breeding season. The four 1 × 1 km survey plots are randomly selected in every quarter of the 10×10 square; (2) surveys of rare, nocturnal and colonial species including specific methodologies targeting raptors, owls, waterbirds and other species with specific behaviour and habitat preferences. Wintering species are surveyed on each 10×10 square for 8 hours. In addition, data from Midwinter counts and Shore and Seabird surveys will be used. The field work in 2021 resulted in applying breeding bird methodology in 128 squares. Casual data were collected in 955 squares. The number of observers that applied the atlas methodology in 2021 was 31 out of a total of 178 observers that provided data during the breeding season. The total number of single data entries during the breeding season of 2021 was 106,460 with a total of 330 species recorded.

05

Taking the Atlas train: the Basque Country will have its own Breeding Bird Atlas

Olatz Aizpurua, Maite Laso, Javier Rodríguez, Juan Arizaga

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Breeding Bird Atlas projects are a key tool in biodiversity management. Covering more or less large areas, they collect breeding bird observations. Modern atlases use species distribution modelling in order to obtain continuous spatial information on the distribution of the breeding bird species in the country/region concerned. The Basque Country (7,234 km^2), one of the most industrial areas of Spain, has never had its own Bird Breeding Atlas. The need for detailed information on the distribution and abundance of the breeding bird assemblage in this region has been a historical demand, given the continuous conflict of interests between the urban and industrial development and nature conservation. Here, we present the Breeding Bird Atlas of the Basque Country, with ca. 180 breeding birds. Field work was done between 2016 and 2020 and involved more than 50 field data collectors, including volunteers and professionals. Field data was collected in 5 × 5 km grid squares, using both qualitative and quantitative sampling approaches. Species distribution modelling was done using random forest and boosted classification trees. We have also calculated abundance ranges and trends for the species where the amount of data allowed. Some preliminary results can be drawn. The forest-dwelling species improve their distribution and numbers, whilst the species linked to countryside and croplands become scarcer e.g. Red-backed Shrike *Lanius collurio* and Tree Sparrow *Passer montanus*. Species linked to shrubland habitats at high altitude, like the Pallid Harrier *Circus macrourus* and the Whinchat *Saxicola rubetra* are now almost extinct from the territory. The Breeding Bird Atlas book will be presented in autumn 2022 and the expectation from the regional Government administration and the general public is very high. For the Aranzadi Science Society (regional private NGO) this has been an outstanding and foremost project, pleased to join the Breeding Bird Atlas challenges and opportunities discussion teams.

06

Towards a new bird atlas in Flanders

Glenn Vermeersch[1], Koen Devos[1], Simon Feys[2], Gerald Driessens[2], Filiep T'Jollyn[1]

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In 2020, fieldwork for a new bird atlas in Flanders was initiated. The previous atlas was based on fieldwork in the 2000–2002 period and focused on breeding birds only. Breeding bird monitoring in the past two decades has shown significant changes in abundance of many species, particularly in farmland and pine forests. For the first time, winter bird counts are included as well. The method used is the same as in 2000–2002 and is also the same as the one used for the atlases in the Netherlands. As a result, all our final maps can be combined, and the underlying data can be easily used in joint publications.

We use the 5 × 5 km UTM grid as backbone. In each square, a fixed pattern of eight 1 × 1 km grid cells was selected. These eight 1 × 1 km squares are counted twice (during 55') in the breeding period and twice in winter. In the centre of each square one or two 5' point counts are carried out as well. In contrast to these strictly timed counts, volunteers are free to spend as much time as needed in the 5×5 square.

Although the methodology is exactly the same as 20 years ago, the data collection process is completely different. We now use an online portal (www.vogelatlas.be) and fieldwork app for data entering. After the fieldwork is completed, extra data layers (from citizen science projects, local inventories etc.) become available to the volunteers (per atlas square) in an online tool. As a result, we believe that final maps and figures will be as complete as possible.

The first results will be presented in this poster, but while the project is ongoing and new data are entered, everyone can check the preliminary species maps at https://www.vogelatlas.be/atlasbe/soorten.

We expect the final publication of the book in early 2025.

07

From complete lists towards a live atlas

Gerard Troost, Paul van Els, Albert de Jong, Erik van Winden

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After the completion of the most recent atlas project in The Netherlands (2012–2015 breeding and winter) quite some observers wanted to continue the standardized counts (1 hour timed visits in 1 km squares) that were a major part of the field work methodology, for example because they were planning their own local or regional atlas project. Besides, at the national scale decent information was still largely lacking about the distribution and changes outside the main breeding and winter periods. A year-round atlas project as was carried out between 1978 and 1982 to fill this knowledge gap would be perfect but is very time consuming.

Instead, we customized our webportal and our iOS and Android app, by which bird watchers can collect complete lists. The data are collected with a very high level of detail. Information such as the walked track, exact time stamp of each sighting, location of the bird and location of the observer are stored.

On this poster we give insights into the possibilities of this data and try to see if this information is suitable for a Live Atlas on bird occurrence and phenology.

08

The second Atlas of Wintering Birds in Ticino, Southern Switzerland

Roberto Lardelli, Chiara Scandolara

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In 1992, Ficedula, Association for the study and conservation of Birds of Southern Switzerland published the Atlas of the birds of Ticino in winter, the first work of its kind in Switzerland. During five winters from 1984 to 1988, more than 21,500 data on 131 species were collected by 121 fieldworkers.

The landscape changes that have taken place in Southern Switzerland and, above all, climate change, have prompted the association to start work for another atlas, a new project that started in 2017.

The data are collected with the ornithological portal ornitho.ch and the useful application NaturaList. Assessment of abundance is assessed with counts on transects of 1 km during 1 h in selected cells of 1 × 1 km.

After 35 years it will be possible to assess the change in bird distribution and their abundance. The current project in progress aims to update the geographical and altitudinal distribution of all species

present in the study area and to produce maps at a scale of 1 × 1 km and models of all species present in winter.

During almost four winters from 2018 to 2021, more than 120,000 data on 152 species were collected by 350 fieldworkers.

The influence of climate change is perceived by the new winter presence of different species such as the Cattle Egret, the Pine Bunting and the significant increase of the Eurasian Blackcap, the Crag Martin, the Common Starling, the Cirl Bunting and the Blue Rock Thrush, especially this last one typically Mediterranean.

09

Population size and distribution of European Nightjar in Southern Switzerland: can bioacoustics help research?

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The European Nightjar *Caprimulgus europaeus* is a nocturnal bird and a long-range migrant, classified in Switzerland as Endangered (EN) on the Red List of Threatened Species and is considered a priority species for conservation. The aim of this research is to use and evaluate a new census method to confirm the presence of the European Nightjar at known and new potential breeding sites. The technique tested consists of the use of automated bioacoustic recording devices (AudioMoths) to indirectly acquire data concerning the presence of this species. In addition, two tests were carried out in order to estimate the maximum distance at which an AudioMoth is able to record the vocalizations of a singing male. Fieldwork was carried out between June 15 and August 7 2020 at 20 distinct sites, located in Ticino, the southernmost canton of Switzerland. The AudioMoths used for this study produced recordings for a total of 1,935 hours. The presence of the species was ascertained in 9 of the 20 sites studied. Six new sites where the European Nightjar was present have been identified. At all three sites where the presence of the species was reported previously, this could be confirmed in this study. At the new sites where vocalizations of the European Nightjar were identified, those were found on average in 50.5% (N=3) of AudioMoths at each site. The 2 tests resulted in a maximum range of 120 m and 260 m respectively. This difference is probably mainly attributable to the different levels of noise pollution at the two sites. In general, this study allowed to broaden the knowledge about the size of the population of European Nightjar in Southern Switzerland and to better understand its distribution, showing the high potential of the bioacoustics for this and other species.

10

Cantonal Inventory of Breeding Sites of the Northern House Martin in Ticino, Southern Switzerland

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The Northern House Martin *Delichon urbicum* is a long-range migratory bird belonging to the family Hirundinidae, which is widespread throughout Europe and breeds in colonies. It was originally found on cliffs, but over the centuries it has learned to use human structures such as bridges and buildings for nesting. It is classified in Switzerland as Near Threatened (NT) on the Red List of Threatened Species, and as a high priority species for conservation.

The aim of the research, carried out in collaboration with the Office for Nature and Landscape of the Canton of Ticino, Switzerland, was to survey all existing colonies on buildings in the Canton and draw up an inventory of them.

During nine information evenings scattered throughout the territory, 126 volunteers were trained. Between June and August 2019, they combed the territory, checking more than 130,000 buildings for nests

or traces of old nests. The colonies were geo-referenced to individual buildings according to the official land register, and some simple data on the type of building were collected. Of the buildings checked, 3,591 had nests or traces of old nests. The number of buildings with occupied nests was 1,827, giving a total of 4,628 occupied nests, 86% of which were natural and the rest artificial.

Quality control of the collected data was also carried out by sampling 25 locations surveyed by volunteers and repeating the survey by experts.

The colonies surveyed were then classified according to different degrees of importance (local, cantonal and national), considering various variables such as number of nests occupied, distance from other colonies and size of the latter.

The data collected will enable the cantonal authorities to implement targeted conservation measures, especially for the colonies defined as priorities.

11

The European Bee-eater in Switzerland – a prime example for the expansion of a thermophilic species

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Since the colonization of Switzerland in 1991 the European Bee-eater *Merops apiaster* has bred every year. The number of breeding pairs increased until 2020 exponentially to 199 pairs in 29 colonies. The 1,180 broods up to now were found in one half of the cantons. The south-western part of the country with the cantons Geneva, Vaud and Valais accommodated 90% of the broods. The mean colony size increased from 2 to 6.9 pairs. The breeding places were occupied for 3.1 years (mean). Most of the breeding places were situated below 800 m asl, one half below 500 m asl; occasionally higher altitudes, up to 1250 m asl, were colonized. Most of the breeding places were in gravel pits (50%), followed by pasture-meadows-habitats with slopes (38%), steep banks of stretch of waters (6,6%), quarries (5.3%) and road construction sites (1.3%). The colonization, spread and increase of breeding numbers of the thermophilic species in Switzerland is probably caused by a rise in temperature by 2°C between 1864 and 2017, similarly as in nearby Central Europe. Within Switzerland, the breeding places lie in the warmest and driest regions. The colonized habitats offer potential for a further increase and spread in Switzerland.

12

The range of Citril Finch – explanations and unsolved mysteries

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The range of the Citril Finch *Carduelis citrinella* reaches its eastern border in the Austrian-German Alps. In contrast to Spain currently suitable adjacent habitats in the eastern Alps are not colonized and the further east we go, density decreases and distribution is patchy. Until today, no satisfactory explanation is known. Optimal habitat in Spain are pine forests.

In the Alps, the main distribution correlates with spruce forest with a species-rich herb layer on limestone bedrock and decreases on crystalline bedrock. Only the herb layer on carbonate bedrock offers milk-ripe seeds of Dandelion and other Asteraceae in high quantities as most important energy source for nestlings in the central European range. In the Mediterranean region, Pine seeds are the most important energy source. Distribution of the Citril Finch during the ice age was restricted to Spain, which is known as refuge area for pine species. Citril Finch evolved closely together with pine.

The population in Central Europe shows less genetic variation than the Spanish population as a result of bottlenecks during the colonisation phase after the ice age and the second after the post-glacial warm period.

Spruce forest is therefore not the ideal habitat. We suppose that reproduction success in pine forest is higher than in spruce forest. That's probably why the population in the Alps can't expand further east.

[cancelled]

Results of recent surveys of bird fauna in Bosnia and Herzegovina

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The first complete list of bird fauna of Bosnia and Herzegovina was published in 2009. It was compiled from the data from numerous works and documents and a list of specimens stored in the National Museum of Bosnia and Herzegovina, and contains a total of 329 species which were historically recorded in the area of the country. Since 2010, six species were added to the list, of which five (*Surnia ulula*, *Cercotrichas galactotes*, *Carpodacus erythrinus*, *Linaria flavirostris* and *Acanthis hornemanni*) were found in previously unpublished works of older Bosnian ornithologists, and one – *Passer italiae* (Vieillot, 1817) – was added on the basis of changes in taxonomy. During the field surveys carried out after 2010, 16 species which have not previously been found in the area of Bosnia and Herzegovina were observed: *Threskiornis aethiopicus*, *Geronticus eremita*, *Arenaria interpres*, *Calidris canutus*, *C. falcinellus*, *Ichthyaetus audouinii*, *Larus argentatus*, *L. cachinnans*, *Falco eleonorae*, *Hippolais polyglotta*, *Acrocephalus agricola*, *Phylloscopus inornatus*, *Ficedula semitorquata*, *Motacilla citreola*, *Emberiza leucocephalos* and *E. pusilla*, increasing the current list of bird fauna of Bosnia and Herzegovina to 351 species. There are also dubious data on the presence of *Aquila rapax*, *Luscinia luscinia* and *Pyrrhocorax pyrrhocorax* but their presence has never been confirmed. During the 2013–2017 period, the first survey of breeding birds in Bosnia and Herzegovina was done for the needs of the EBBA2, and a total of 215 breeding bird species were recorded, in comparison to the historically recorded number of 239. During recent times, breeding activity was not observed for 22 previously known breeding species, the activity was reconfirmed for 8 species which were thought to have stopped breeding in the country, and breeding was observed for the first time for 11 species. The status for *Falco vespertinus* and *Oenanthe melanoleuca* still needs to be confirmed.

Population estimates

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Population Status of Collared Pratincole in Albania

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Collared Pratincole *Glareola pratincola* is a breeding species in Albania. The aim of this poster is to present the latest findings on its breeding numbers, distribution, and habitat selection in the country. The research work has been carried out during 2019–2021. An initial model of habitat requirements has been described based on two already known colonies of this species. Based on this model, a map was built, where similar habitats in three different wetlands in Albania have been identified and visited during the breeding season in order to search for new colonies. Three new colonies were found during this study, making a total population size that is estimated between 437 and 509 breeding pairs in the year 2020. All the colonies are situated in non-dense *Salicornia* sp habitats. These findings increase the national population up to five times and show that Albania contains a significant portion of the European Population that goes up to 6.5%.

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Breeding population size of Mandarin duck in Warsaw agglomeration in 2016–2021

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First observations of Mandarin ducks *Aix galericulata* in the wild in Poland were collected in the 1960s. All of them represent cases of single individuals that probably escaped from private farms. The first brood was found in 2001 in The Royal Łazienki Park, Warsaw. Presence of mandarin ducks in this location was the result of the intentional introduction of six individuals (three pairs) as ornamental birds at the end of the 1990s. This wild population gradually increased up to 100 individuals during the next 12 years. The Royal Łazienki Park was the only place where females with chicks were observed regularly during that time. From 2013 onwards, a systematic increase in the number of breeding pairs began that was linked with colonization of new water bodies within the city. Regular counts of birds performed in years 2016–2021 revealed an increase from 75–80 pairs in 2016 up to 90–100 pairs in 2021. The average population growth rate was estimated at 4% per year. Currently, the species inhabits a wide range of water habitats and females with chicks are observed in more than 20 different locations. The local population is characterized by male-biased sex ratio among adult individuals (60.3%). Low number of females was associated with their high mortality caused by predation of marten *Martes* sp. during the incubation period. The number of fledglings at the beginning of the breeding season was 253 in 2016 and 167 in 2017. The mortality of ducklings was high (73.9% and 65.3% in 2016–2017) and the main factor responsible for chick deaths during fledgling period was predation of the Hooded crow *Corvus cornix*.

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Survey of riparian bird species in Romania

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In 2021 we conducted a country-wide survey to estimate population size and distribution of four bird species connected to rivers: Common Sandpiper *Actitis hypoleucos*, Little Ringed Plover *Charadrius dubius*, Common Kingfisher *Alcedo atthis* and Collared Sand Martin *Riparia riparia*. Teams of three observers were visiting 300 river sections of 5 km length, between 15 May and 15 June. Two observers were conducting the survey from a boat, while the third was checking the adjacent areas for suitable breeding sites (sand pits, gravel extraction). Data were recorded directly in the OpenBioMaps mobile phone app, using a specific data form. Apart from the Danube where only the left bank was checked, observers were asked to survey both river sides. Based on the collected data we estimated 1,514 pairs of Common Sandpiper, 2,347 pairs of Little Ringed Plover, 1,863 pairs of Kingfisher and 176,125 pairs of Sand Martin. However, these estimates should be used with caution, as we realized a few weak points of the survey: the sampled sections were not covering the small river courses, especially in the mountains, there could be observer bias in the species detection (mostly in the case of the Little Ringed Plover) and in separating the active and unused nest holes in Sand Martin colonies.

[cancelled]

Using the square survey method to assess the distribution and abundance dynamics of the Kentish Plover *Charadrius alexandrinus* in European Russia

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Recently we have created a dataset for records of Kentish Plover *Charadrius alexandrinus* in European Russia. We used published and own data, information from different Russian ornithological collections, and put these data into dataset. At the present the dataset includes more than 400 observations of Kentish Plover in European Russia. We combined data before and after 2000 and used the 50-km squares of the UTM WGS84 grid across Europe to visualize the available information on a map.

In European Russia Kentish Plover breeds in open mudflats and sandbanks along the shores of the Black, Azov and Caspian seas and salt lakes, Ciscaucasia and Lower Volga. Kentish plover breeds in Rostov, Krasnodar, Stavropol, Volgograd, Astrakhan regions, Republic of Kalmykia and Dagestan. Looking at the entire period for which data were available Kentish Plover bred in 44 squares, in 17 squares the species was always present, in 13 squares it disappeared and in 14 squares it appeared for first time.

The number of individuals in the North Caucasus is low and the species is included in most regional Red data Books. Modern estimates for regions are 100–150 pairs breed for Rostov region, 300 bp for Krasnodar, 230 bp for Stavropol, 100–120 bp for Volgograd, 500 bp for Kalmykia, less than 10 bp for Astrakhan, 30–40 bp for Dagestan. Before 2000 the population of Kentish Plover in European Russia was estimated to comprise1–10 thousand breeding pairs (Hagemeijer & Blair 1997; Heath et al. 2000), just after 2000 at 150–1,300 breeding pairs (Mishchenko 2004). Based on the available data, prepared for EBBA2, the current population of Kentish Plover in European Russia is estimated to comprise 900–1,100 breeding pairs. The numbers in 4 squares did not change, decreases occurred in 16 squares and increases in 24 squares.

We must refer critically to the obtained data due to the unevenness of observations in different periods and more detailed investigations in recent years. In general we can assume that distribution and population of the species in European Russia fluctuates or slightly declines.

[cancelled]

Breeding population estimates of Common Goldeneye *Bucephala c. clangula* (Palmer 1976, Bellrose 1980) in Romania

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The Common Goldeneye is regarded as a northern breeding species mostly restricted to the boreal forests. Breeding in the areas that are outside the main range are sometimes overlooked. In the early 1900s, the Goldeneye was regarded as a common species that, although occurring in relatively small numbers, nested in the floodplains of lower Danube, as well as in the Danube Delta. In Romania it is recorded as breeding species until the 1960s. In the following decade Goldeneye was mentioned only as a transient winter visitor in Romania from October to March. In the late 1990s breeding was reconfirmed in the Danube Delta and since 2000 nesting have been recorded. Our results indicate a significantly larger breeding population than twenty years ago with an increasing trend and a wider distribution for Danube Delta Biosphere Reserve and along the lower Danube riparian forests in last years. We estimate a breeding population of 150–250 pairs for Romania. The records presented are the result of observations performed in different research projects in the last 20 years by ornithologists.

Population monitoring

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Status of breeding birds on the Red Sea Islands of Egypt, 2012 to 2021

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The northern Egyptian Red Sea supports a number of bird species either rare or not found elsewhere in the Western Palearctic and is thus considered an area of ornithological importance. I present the results of a survey of the northern Red Sea Islands to Rocky Island Southeast of the Egyptian border between 2012 and 2021 to assess the status of breeding seabirds in the Egyptian Red Sea, highlight threats and identify some conservation management options. Species observed were Ospreys *Pandion haliaetus*, Sooty Falcon *Falco concolor*, Brown Booby *Sula (leucogaster) plotus*, Eurasian Spoonbill *Platalea leucorodia*, Sooty Gull *Ichthyaetus hemprichii*, White-Eyed Gull *Ichthyaetus leucophthalmus*, Caspian Tern *Hydroprogne caspia*, White-Cheeked Tern *Sterna repressa*, Lesser Crested Tern *Thalasseus bengalensis*, Swift Tern *Thalasseus bergii*, Bridled Tern *Onychoprion [anaethetus] anaethetus*, and Saunders's Tern *Sternula saundersi*. Freedom from human disturbance and food availability are probably the most important factors influencing the distribution of breeding seabirds in the Egyptian Red Sea. Most species were breeding in spring or summer but two bred in winter. Summer is a particularly stressful period for nesting birds due to the extreme temperatures. Threats to seabirds feeding at sea include oil spills from rigs and bilge water contaminated from vessels. Also, tourists and fishermen landing on islands cause birds to desert nests. To protect nesting birds, tourists and fishermen should be prohibited from landing on islands during the breeding season.

17

Analysis of diversity and waterbird census for the creation of a regional wetlands observatory: Sabkhet of Aures complex, North East Algeria

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This study was carried out as part of an AFD-FFEM micro-project aiming to create a regional wetlands observatory in Algeria, in particular the establishment of an inter-operational database of waterbird communities. This would allow the establishment of an inventory and methodologies for monitoring the environmental state taking into account the communitiy structure and the population dynamics as indicators of wetland health. We collected a database from waterbird censuses during the period 1978–2019 as well as scientific publications, theses, dissertations and other reports. Data relate to a set of 12 Ramsar wetlands located in the "Aurès Sebkhates" wetland complex, northeast Algeria. The inventory included 56 species covering 8 orders and 15 families. *Phoenicopterus roseus* and *Charadrius alexandrinus* are the most abundant and constant species. Gareat El Taref wetland hosted the highest diversity values with a total specific richness (S= 31) and Shannon index (H' = 3.30), whereas the lowest waterbird diversity was noted in Chott Tinsilt (S= 8; H'=1.56). According to the IUCN Red List, *Numenius tenuirostris* is classified as Critically Endangered; *Oxyura leucocephala* is considered as Endangered species. Four species are considered Near Threatened (*Vanellus vanellus*, *Calidris canutus*, *Limosa limosa* and *Numenius arquata*); and three species are classified vulnerable (*Anas angustirostris*, *Aythya ferina* and *Larus audouinii*). At the national level, 21 species are protected in Algeria. In terms of phenological categories, 77.19% of species are wintering migratory. Waterbird species with Palearctic status are the most represented (40.74%). The trophic status showed that the polyphagous species are dominant (45.45%). The analysis of developed databases allow us to suggest a monitoring program and conservation actions for waterbirds and wetlands.

18

General increase in abundance and distribution of wintering geese and swans in Denmark

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The majority of wintering goose and swan populations in Denmark and the rest of Northwestern Europe have increased significantly during the last decades. A large proportion of these occur in Denmark during winter.

Knowledge on these changes is highly relevant for the management of these species since the majority forage on winter crops. This has led to increasing conflicts with farmers due to the negative impact the foraging has on production and thereby the economy. The scale of the changes in abundance and the timely changes during the period of increase has hitherto remained unreported in a systematic and comparable way.

Here we present status and changes over the last decades in the abundance (midwinter counts) and distribution (DOFbasen data) of goose and swan winter populations in Denmark.

Midwinter counts are performed all across Denmark every January by involvement of a large number of volunteer birdwatchers. DOFbasen (www.dofbasen.dk) is the main database for casual bird observations in Denmark and provides the data for a description of the distributional changes in this study. Despite the unsystematic nature of the data, the very high number of records of birds (presently 2.2 million annually; 28 million in total) from all over the country makes these data highly useful to describe changes in distribution and phenology in the Danish landscape.

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Long-term monitoring of Birds of Prey and Owls at the Kvernaki Ridge, Georgia

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Complex study of Birds of Prey and Owls has been carried out at the Kvernaki Ridge, in Eastern Georgia. Northern slope covered with fragments of deciduous forests, scrublands, fields, pastures. Deep gorges, volcanic rocks, ravines with semi-desert and steppe vegetation are cutting through the southern slope. Elevation: 450–1070 m asl. Fieldwork conducted in the years 1977–1991, 1999–2000, 2017–2021. Duration of fieldwork was 371 days: 104 in spring, 132 in autumn, 98 in summer and 37 in winter. Among the 32 recorded raptor species breeding was confirmed for seven. Five species nested regularly. Egyptian Vulture *Neophron percnopterus* – 3–4 pairs nested annually in 1970s–2000 and 2–3 in 2017–2021. Nests located in partially destroyed caves that were made by man in the Middle Ages. Short-toed Snake-Eagle *Circaetus gallicus* – rare breeder (1–3 pairs). Common Buzzard *Buteo buteo* – 12–20 pairs in different years. Long-legged Buzzard *Buteo rufinus* – (4–9 pairs). Common Kestrel *Falco tinnunculus* – numbers fluctuated by years from six pairs (2021) – seven (2019) to 14 (1979) and 12 (1999). Bonelli's Eagle *Aquila fasciata* – Kvernaki Ridge is the only place in Georgia and one of the few in the entire Caucasus where cases of nesting have been noted. Twice, in 1984 and 1995, occupied nests found. Perhaps nested in 2005, in spring-summer several times pairs and solitary individuals watched, but no nest found. Lesser Kestrel *Falco naumanni* – 5–7 pairs annually nested in a small colony in 1970–1980s. Nests were situated in the roof of a seasonal sheep-fold. In 1989, this farm burned down, since 1990 no nesting has been observed. Among six observed owl species, three nested. Eagle Owl *Bubo bubo* – 3–5 pairs. Eurasian Scops Owl *Otus scops* – 12–16 pairs. Little Owl *Athene noctua* – 15–25 pairs. Present status, habitat selection, numbers, breeding biology, migrations, limiting factors, threats, problems of conservation discussed.

20

A modular approach to the monitoring of rare breeding birds in Germany

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Traditionally data on rare breeding birds in Germany have been gathered via annual queries, sent out to the responsible institutions, to collect up-to-date population estimates at federal state (= Länder) level. This approach worked well for decades, but also induced challenges concerning data quality and comparability due to little standardisation across the federal states concerning the applied field methods and varying survey effort. Furthermore this approach only covered those species for which totals at federal state level can be estimated.

In 2017 it was decided to – step by step – switch to a modular approach with Germany-wide standardised protocols. The primary goal is a precise estimate of population change. Population totals are aimed at only in very rare or highly aggregated (mainly colonial) species. Up to 2021 10 modules were implemented: Cirl Bunting *Emberiza cirlus*, Corncrake *Crex crex*, Grey Heron *Ardea cinerea*, gulls and terns, meadow birds, reed breeders, Rook *Corvus frugilegus*, Collared Sand Martin *Riparia riparia*, waterbirds, woodpeckers. Distinct modules for individual species (e.g. single colonial breeding species) and concise species groups (e.g. woodpeckers) allow for the definition of simple, tailor-made methods, facilitating the participation of volunteers for the following reasons: 1) survey effort from as little as 1 visit per year, 2) possibility to participate in several modules across the breeding season, covering species of personal interest and 3) opportunity to participate also with little field experience.

Data can be recorded directly from the fields using the NaturaList app or – if done on paper – later via ornitho.de. Data analysis is done automatically in a standardised way based on raw data. Hence desk work is reduced to a minimum. The highly automated data flow also reduces workloads for coordinators and allows short term feedback. Judging from the constantly increasing numbers of people getting involved so far our approach seems to be quite successful.

[cancelled]

Waterbird monitoring at the Upper Yauza Wetlands, Russia

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In 2019–2021 we surveyed the western part of the Upper Yauza Wetlands located within Losiny Ostrov (Elk Island) National Park in Moscow Region. The study area of 180 hectares was occupied by a colony of the Black-headed Gull *Larus ridibundus* (BHG) numbered at 5,000–6,000 pairs. Regular counts and observations were conducted every year between March and December. Altogether, we found 40 waterbird species, of which 18 species have used the area for breeding and 22 species occurred only on passage or feeding. During spring migration and breeding seasons (March–July) and during post-breeding and autumn migration seasons (August–December) we recorded 31 and 33 species respectively. The area held the highest waterbird diversity In April, August and September, and biggest total population (without BHG) in October. Besides BHG, the Common Coot *Fulica atra*, Eurasian Wigeon *Mareca penelope* and Mallard *Anas platyrhynchos* were the most abundant species. Mute Swan *Cygnus olor*, Mallard, Common Pochard *Aythya ferina*, Tufted Duck *Aythya fuligula*, Common Goldeneye *Bucephala clangula* and Coot were the last species to leave the area before freezing in late November and early December. Based on data collected at one-week interval, we prepared the calendar of migrations and identified the changes between years.

Trends and indicators

21

Trends and spatial distributions of four duck-species in IBA Lake Lauwers (Netherlands), as function of food availability and food distribution

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Lake Lauwers, located in the north of the Netherlands, is an important bird area (IBA) under the EU Birds Directive, with Tufted Duck (*Aythya fuligula*), Common Pochard (*A. ferina*), Common Goldeneye (*Bucephala clangula*) and Smew (*Mergellus albellus*) among the protected species. There is concern about possible declining trends of these bird species. For each species, we compared trends of their respective winter numbers between 1992 and 2017 in Lake Lauwers with trends in Lake IJssel (the largest freshwater lake in the Netherlands), national trends and international trends. Changes in spatial distribution of birds within Lake Lauwers between 1992 and 2017 were analysed, as well as the distribution and availability of food resources, in particular aquatic vegetation, macro-invertebrates and fish. Due to the lack of historic data, we collected samples of macro-invertebrates and bivalves in a two-day field survey. The results revealed a clear declining trend only for Pochard. However, this trend corresponded with declining trends in other areas (Lake IJssel, nationally and internationally). Further analysis revealed a significant correlation between the spatial distribution of Pochards and of fennel pondweed (*Potamogeton pectinatus*). However, no significant correlation was found between the total number of Pochards and the yearly average biomass of fennel pondweed, again underlining that the yearly numbers are driven by changes elsewhere. Tufted duck numbers are increasing, especially in the southern part of the lake. The increase in the southern part could be linked to the colonization of bivalves of these areas, revealed by our macro-invertebrate survey. Goldeneye and Smew have stable trends and show no major shifts in spatial distributions. Interestingly, specific smaller areas with former high densities of Goldeneye and Smew were no longer in use. Our study reveals how an in-depth analysis of food availability can help to establish specific measures for bird species and gives several approaches for such analysis.

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Wintering waterfowl in Latvia 1991–2021

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Wetlands International mid-winter waterfowl counts have been performed at various coastal sites striving for 100% coverage of the 500 km Latvian coastline as well as at about 100–700 inland sites. About 40 waterfowl species have been registered during these counts. For the most abundant and regular indices were calculated, using BirdSTATs (http://www.ebcc.info/trim.html).

For the time period 1991–2021 Grey Heron *Ardea cinerea* and Velvet Scoter *Melanitta fusca* show strong increase, Great Cormorant *Phalacrocorax carbo*, Mute Swan *Cygnus olor*, Whooper Swan *C. cygnus*, Common Goldeneye *Bucephala clangula*, Goosander *Mergus merganser*, Smew *Mergellus albellus*, Common Teal *Anas crecca*, Mallard *Anas platyrhynchos*, Tufted Duck *Aythya fuligula*, Long-tailed Duck *Clangula hyemalis*, Velvet Scoter *Melanitta nigra*, Common Coot *Fulica atra* and Black-headed Gull *Larus ridibundus* show moderate increase, Red-breasted Merganser *Mergus serrator* and Great Black-backed Gull *Larus marinus* have been stable and changes in Great Crested Grebe *Podiceps* cristatus, Little Grebe *Tachybaptus ruficollis*, divers *Gavia* sp. and Wigeon *Mareca penelope* remain unclear. No wintering species shows a statistically significant decrease.

23

New indicators based on Relative Habitat Use

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This repeated study, originally from 2010 (Heldbjerg et al.), confirms that existing indicators of bird biodiversity in Denmark are inaccurate, and we make repeated use of the more objective method for accurately assessing trends in specific habitats using common bird species. Bird species are now selected for creating habitat specific indicators by calculating their relative habitat use (RHU) in nine different habitat categories. RHU indicates the degree to which a habitat is preferred (RHU >2) or avoided (RHU <0.5) by a species, relative to other habitats. Indicator sets are constructed for each habitat type using species with an RHU >2 and reveal that existing habitat indicators, based on species lists from the Pan-European Common Bird Monitoring Scheme (PECBMS), often include species that do not in fact have preferences for those particular habitats in Denmark. Habitat specific indicators based on the new species selection method show significantly different trends in some of the nine habitat categories.

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Assessing the effectiveness of EU Special Protection Areas to protect birds of conservation concern with semi-structured citizen science data

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The Natura 2000 system of the European Union is the largest coherent network of protected areas in the world. It consists of Special Protection Areas (SPAs) aimed at the in-situ conservation of birds, and Special Areas of Conservation (SAC) that were designed to maintain and improve habitats and populations of other threatened taxa. While the general effectiveness of SPAs and SACs in conserving biodiversity has been demonstrated, it is largely unclear how SPA designation and site management affect bird population trends and their conservation status on the levels of the member states, including Germany. This is partly due to a lack of structured long-term monitoring data for rather rare species. Citizen science data, which are increasingly used in applied ecological research and conservation planning, have been suggested to be a promising alternative data source that might fill this gap.

Ornitho.de is an online database of bird observations collected by experienced birdwatchers and the general public across Germany. The database provides a large amount of unstructured (ad hoc) observations and semi-structured data (checklists) for a wide range of species. However, the lack of a standardized monitoring protocol entails several challenges and can lead to biased statistical inference. To address these challenges, we use only semi-structured checklist data of target breeding bird species and apply data filtering and spatial subsampling. We run occupancy models on the refined datasets covering nine consecutive years and incorporate habitat information to correct for potential confounding effects of habitat. Using a habitat matching approach, we derive occupancy trends across compositionally similar sites inside and outside SPAs. We finally compare our trends with those from structured monitoring programs. Based on our results, we will discuss the strengths and weaknesses of ornitho.de checklists for estimating trends and their usability to assess the effectiveness of SPAs.

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Trends and indices of partially migratory forest specialists during breeding, migration and wintering period in Estonia

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We analyzed trends (1987–2020) of five stages of 14 forest-breeding bird species. The choice of species was based on the trapping efficiency of the partially migrating or late-dispersing species in Kabli bird station during autumn migration (since 1972, migration stage – MS). For breeding stage (BS) data, point census scheme (since 1983) was used. For the three wintering stages (WS), data from winter bird census scheme (since 1987) were used. Population indices and trends for different stages of the yearly life cycle were modelled using RTRIM.

BS populations of most of the species have stable trends (11 species), while three species are decreasing. The MS suggests the opposite – eight species have moderate and one strong decrease. No positive trends were detected within MS. Trends of WS were in general similar within species. Six species had at least one moderate decrease and six species had at least one increase within the three WS.

Comparison of trend estimates revealed that MS and all three WS (ANOVA, $F1.68=8.3$; $p<0.01$) have a significant differences, while MS are mostly negative and WS trends positive. Further analysis with breeding-habitat preference showed that despite the tendency that MS and WS trends differ in general, significant differences exist only within the group of species that breed in coniferous forests (ANOVA, $F4.55=7.13$; $p<0.001$).

Speaking of population indices, indices of WS correlate with each other better than BS and MS indices. A positive correlation between BS indices and MS was found only for Long-tailed tit *Aegithalos caudatus*. Four species had positive correlations between indices of MS and first WS. These findings could be related to reproductive success. Only Goldcrest *Regulus regulus* seems to have a slight negative correlation between MS and WS counts. The results suggest that partial migrants have become more sedentary during the last 40 years.

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Changes in phenology of the laying dates and clutch size of the Common Starling *Sturnus vulgaris* in Latvia 1950–2021

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We analysed historic nest card records and observations in sample plots of Common Starling in Latvia since 1950s and compared the data with those of 2020 and 2021. Wolfgang Schneider in his monograph “Der Star [Starling]” (1972) showed that clutch size of Starling decreaed comparing two periods 1951–1958 vs. 1959–1971 in his sample plot near Leipzig, Germany. By analysing 643 full clutches in Latvia 1950–2021 we did not find any trend in data ($r=0.04$; $p=0.35$), but our sample was skewed towards modern data – total of 485 clutches in 2020 and 2021, so we will extract more data of old notebooks to enlarge the historic sample size. The same data pool yielded 537 cases, where date of laying the first egg is known. Regression showed that Starlings in Latvia are laying their first egg earlier for the period 1963–2021 ($r=–0.60$; $p<0.000$; $n=537$). If this has any effect on the survival of the offspring in the nests and in the post-breeding period, remain questions for further study.

[cancelled]

The PARUS program: the results of 32-year wintering bird monitoring in European Russia

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We present an update on wintering species trends and indicators from the PARUS program, a 32-year monitoring project with a large-scale network of census points across the forest zone of European Russia. The scheme is run both by professional ornithologists and volunteers who perform annual wintering bird counts. Its results allow to estimate bird population density in typical forest habitats. We analysed population trends from 1988 to 2021 for 22 common species. We used rtrim() package for R to calculate yearly indices and assess their trend (log-linear growth rate), and MSI tool to obtain multispecies indicators. Most species with significant trends decreased their number, and only one had a positive trend. The decline was more pronounced in species associated with coniferous forests. Similar tendencies occurred in some neighbouring countries. The probable reason for negative dynamics may be the decrease of the area of old conifer stands, as well as climate change.

Drivers of change

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Changes in the population dynamics of a high-alpine specialist

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White-winged Snowfinches *Montifringilla nivalis* are high-alpine specialists breeding in mountain ranges across Central and Southern Europe. Snowfinches are thus adapted to habitats typically characterised by low temperatures, prolonged periods of snow cover and short vegetation periods but also experience strong seasonality between years.

However, recent, broad landscape change, disproportionate warming and changing snow cover durations challenge the integrity of alpine environments and their cold-adapted residents and thus, Snowfinches. The Swiss Snowfinch population has declined by about 20% in the last 30 years but this decline is not uniform across Switzerland. In a first step we thus analysed a three-year point count and transect dataset from Switzerland to characterise the breeding habitat of Snowfinches. In a second step, we compared population count data from 1993–1996 with data from 2013–2016 to correlate changes in the Snowfinch populations with changes in those habitat characteristics across Switzerland. We identified important environmental parameters affecting the population dynamics of Snowfinches in the Swiss Alps. We discuss the effects of seasonality in snow condition on chick-rearing and its effects on the accessibility of invertebrate prey items.

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Species traits drive long-term population trends of common breeding birds in Northern Italy

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Long-term population trends are considerable sources of information to set wildlife conservation priorities and to evaluate the performance of management actions. In addition, trends observed in functional groups (e.g., trophic guilds) can provide the foundation to test specific hypotheses about the drivers of the observed population dynamics. The aims of this study were to assess population trends of breeding birds in Lombardy (N Italy) from 1992 to 2019 and to explore the relationships between trends and species sharing similar ecological and life history traits. Trends were quantified and tested for significance by weighted linear regression models and using yearly population indices (median and 95% confidence interval) predicted through generalized additive models. Results showed that 45% of the species increased, 24% decreased, and 31% showed non-significant trends. Life history trait analyses revealed a general decrease of migrants, of species with short incubation period and of species with high annual fecundity. Ecological trait analyses showed that plant-eaters and species feeding on invertebrates, farmland birds, and ground-nesters declined, while woodland birds increased. Further studies should focus on investigation of the relationship between long-term trends and species traits at large spatial scales, and on quantifying the effects of specific drivers across multiple functional groups.

Methods and analytical techniques

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Using the earth mover's distance to assess changes in species' spatial distribution

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In the complex task of bird monitoring, one of the many questions of interest is how the spatial distribution of a species evolves over time. To identify changes in spatial distribution across a given region (e.g., a country), it is helpful to have a measure of how similar the distribution was in (say) consecutive years. We demonstrate the use of the earth mover's distance (EMD, also known as the Wasserstein metric) for this purpose. An advantage of this measure is its meaningful interpretation and the availability of tools that facilitate its calculation for bird monitoring data in R. We illustrate an application of the measure using the long-term data from the International Waterbird Census as well as from May counts of the Monitoring of Waterbird Breeding Populations.

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The estimation of productivity in diving ducks: a comparison of individual monitoring and brood counts.

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Knowledge of diving duck productivity is of crucial importance not only for understanding population dynamics but also for wildlife management, especially for suggestions of proper conservation actions. Accurate assessment of individual reproductive success in a given site and breeding season should result from a survey of individually marked breeding females, which is time demanding as well as required for advanced field experiences of involved researchers. Moreover, such a survey can be conducted in only a limited area. On the other hand, numerous volunteers can be involved in large-scale duck and brood monitoring. Therefore, we focus on a comparison of approaches for counting diving duck productivity based on both (1) monitoring of individually marked females (marked with nasal saddles and colour rings on both legs and (2) census of females occurring in the study area at the beginning of the breeding season and number of broods recorded during the breeding season. Diving duck productivity was measured as the number of broods and/or numbers of broods per female recorded at the beginning of the breeding season. Data were sampled for Common Pochard *Aythya ferina* and Tufted Duck *Aythya fuligula* on 173 fishponds located in South Bohemia (Czech Republic) in 2004–2021. We found significant correlations between diving duck productivity (as for the number of ducks as well as for brood per female ratio) measured by both above-mentioned approaches. These results recommend a combination of adults and brood counts for large-scale monitoring of diving duck productivity. Possible sources of census bias will be discussed in the poster.

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How many brood counts per season do we need for analysis of long-term trends and foraging habitat selection?

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Broods of many waterbird species can be easily counted on surface or shoreline of various wetlands (e.g. lakes, reservoirs, fishponds and rivers). Waterbird breeding season is quite extended, including early breeding species rearing broods since early April (e.g. Greylag Goose) up to late breeding species rearing broods in July and August (e.g. Tufted Duck). Moreover, several single species have prolonged breeding season with hatching dates from April to late July (e.g. Mallard or Great Crested Grebe). Hence, the brood survey is based on repeated multiple counts in 1–2 weeks intervals during the whole breeding season. Nevertheless, this approach is quite time-consuming and it cannot be easily applied in large-scale monitoring programs. Therefore, we use data from 12 waterbird species (Mute Swan, Greylag Goose, Gadwall, Mallard, Red-crested Pochard, Common Pochard, Tufted Duck, Common Goldeneye, Little Grebe, Great Crested Grebe, Black-necked Grebe, Common Coot) sampled by annual monitoring (2004–2021) carried out on 173 fishponds in South Bohemia (Czech Republic). We assess one-term, double-term and multi-term approaches of brood counts for (1) analysis of long-term trends in brood numbers and for (2) study of foraging habitat selection, i.e. selection of single fishponds according to invertebrate food availability by diving duck and other waterbird broods. We find the single counts can be used in case of proper timing of these counts. Nevertheless, this proper timing of census can vary among the different waterbird species. In conclusion, we can recommend a census based on double counts carried in the different terms in distance of more than 1–2 weeks. This approach provides similar results with repeated multiple counts for both (1) analysis of long-term trends in brood numbers and for (2) study of foraging habitat selection.

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Using an integrated population model to quantify the decline of an albatross population with a stable number of breeding pairs

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For long-lived bird species with delayed fecundity and low reproductive rates, the effects of conservation interventions can take decades to be visible in those parts of a population that are routinely monitored. Predicting the consequences of management action therefore requires knowledge of key demographic parameters that allow the estimation of unobservable parts of the population. Albatrosses are among the longest-living bird species and are threatened on land by invasive species and at sea by industrial fisheries. Usually only a small proportion of their population is comprehensively accounted for (breeding adults), making it particularly difficult to assess their population trends and the potential benefit of conservation management. We used population monitoring and mark-recapture data in an integrated population model to estimate the past trajectory of the Critically Endangered Tristan Albatross *Diomedea dabbenena*, and project the future trajectory for scenarios with or without invasive species management on Gough Island, a UK Overseas Territory in the South Atlantic Ocean. We found that the adult breeding population had remained stable, but that due to low annual productivity (0.31 fledglings/pair) the total population (including unobservable immature birds) had declined from ~10,000 to ~6,250 birds between 2004 and 2021. We predicted that an invasive species eradication leading to a two-fold increase in breeding success would result in a 1.7–7.4 times higher albatross population in 2,050 (~8,000 individuals) than without this intervention. Our study shows that low reproductive output for a long-lived bird species can lead to a decline in the total population, which can be obscured from monitoring data based on breeding adults by individuals returning to the breeding colony at younger ages. The lag in detectable population trends for long-lived species should be considered when assessing threats and the success of conservation interventions.

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Making more of bird occurrence data: linking community composition and trait evolution to detect the imprint that past interactions have left on present-day assemblages

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While it is generally acknowledged that “nothing in evolution or ecology makes sense except in the light of the other” how exactly this mutual interaction can be understood is an area of active research. We are starting to understand how evolutionary history, such as trait evolution and phylogenetic information, explains ecological processes and patterns and how ecology, that is, species associations and population dynamics, depends on evolutionary history. In this vein, there is growing interest in considering the role of evolutionary processes in shaping community structure at the local scale to explicitly determine the role of historical processes in the study of contemporary community assembly. Hence, the integration of comparative phylogenetic methods and community ecology constitutes a research avenue that fosters the connection of two research areas (clade-level evolutionary patterns and local ecological mechanisms) that are rarely considered together. At this point, the increasing availability of occurrence data from long-term monitoring programs or citizen-science projects provides an excellent opportunity to merge both fields and improve our understanding of eco-evolutionary dynamics of bird communities. Here, we take advantage of breeding bird data from the Australian New Atlas to apply a recently developed approach that identifies clades that are eco-phylogenetically clustered or overdispersed and assesses whether those clades have different rates of trait evolution. Using this methodology, which

integrate community, phylogenetic and functional data, it is possible to detect clades whose species do and do not, tend to co-occur, and thus detect and disentangle variation in ecological structure across the phylogeny. In this way, we will test whether there is an association between the ecological co-occurrence patterns of certain species/clades and their evolutionary history. This approach will allow us to identify those clades with singular trait evolution, which can be useful from a conservation perspective.

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Combining two independent counting programmes to improve abundance estimates

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In the context of wildlife population declines, increasing computer power and advances in statistics can help improve estimates of population sizes while considering imperfect detection of individuals. Model-based data integration is particularly relevant to take advantage of independent protocols in order to understand population dynamics more reliably. Here we present a state-space model with an error process modelled on the log scale to evaluate wintering waterfowl numbers in the Camargue, southern France, while taking a conditional probability of detection into consideration. Conditional probability of detection corresponds to estimation of detection probabilities index relative to the value set for one of the parameters. The overall high probability of detection of waterfowl (gregarious species), the large number of sites (wetlands within the Camargue delta) and years monitored (44) made it possible to combine both terrestrial and aerial surveys (which constituted spatially and temporally replicated counts) to estimate a conditional probability of detection, while accounting for false-positive counting errors and changes in observers over the study period. The model estimates abundance indices of wintering Common Teal, Mallard and Common Coot, all species abundant in the area. We found that raw counts were underestimated compared to the predicted population size. The model-based data integration approach as described here seems like a promising solution that takes advantage of as much as possible of the data collected from several methods.

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Analysing breeding bird trends from monitoring data with a highly structured sampling design

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Monitoring programmes are an essential tool in bird conservation since the derived trends help in identifying species of highest conservation concern and inform about the efficiency of existing conservation measures. However, monitoring data often come along with several challenges for statistical analysis, including non-representative sampling of different habitats, observer effects, missing values, as well as overdispersion and zero-inflation. Ignoring these problems [in the analysis] can reduce the reliability and robustness of estimated trends. Although common analytical tools like Trends and Indices for Monitoring data (TRIM) treat many of these problems, they reach their limits on highly structured designs with many missing values as routinely present in rolling or rotating survey designs.

Therefore, we developed a technique to analyse breeding bird trends based on highly structured data, using long-term monitoring data from North-Rhine Westphalia, Germany. Trends were estimated using generalized additive mixed models (GAMMs) within a Bayesian framework. We derived criteria for species-specific choices of model structure and family, based on an assessment of model fit and adequate reflection of (over)dispersion and zero-inflation. Additionally, weighting the response variable

abundance accounted for a non-representative sampling of habitats per year. Observer effects were successfully handled by categorizing surveys based on their total detected abundance summed up across all species. For quality assurance, we used TRIM-based indices and data from the German Common Breeding Bird scheme. Trends derived from this scheme coincided well with our estimated trends, confirming the reliability and robustness of our trends.

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Disentangling the relative contribution of abiotic and biotic factors in shaping species assemblages of Australian birds

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Community assembly is a process driven by both stochastic and deterministic processes. The relative effect of these forces in shaping the composition and the structure of communities still remains unclear. Such selective forces correspond to environmental filtering and biotic interactions, which arise in response to the nature of the habitat, the climatic conditions, and the coexistence of species. Here, we analysed the importance and relative contribution of these main drivers of community assembly on bird communities of southeastern Queensland (Australia). For this purpose, we first will correct for imperfect detection by using a multi-season community N-mixture model. Subsequently, we will apply a joint species distribution model (jSDM) within the Hierarchical Modelling of Species Communities (HMSC) framework, which partitions variation in species occurrences to components that relate to environmental filtering, species interactions, and random processes. By merging bird occurrences, environmental data, species-specific traits, and phylogenetic data we will try to determine (i) how much variation in species occurrence is due to abiotic factors, biotic processes like competition or facilitation, and stochastic processes, (ii) if some species indicate the presence of others, and (iii) how can species be classified in terms of their response to the abiotic environment. Thus, the expected outcome of our model will help us to elucidate community-level patterns in how species respond to the environment and to quantify co-occurrence patterns among species. This information is relevant from an applied standpoint and can be used to guide management actions and conservation efforts in a region that has been identified as vulnerable to the impacts of global warming.

New technologies

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Contribution of artificial intelligence for collecting data on birds

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Since 2018, Artificial Intelligence technology based on deep learning from validated fauna and flora pictures is used in the online nature portal Observations.be. This Nature Identification API (NIA) is also used by a citizen science app called ObsIdentify linked to the online recording system. This NIA suggests identification at the species level of the subject presented on any picture uploaded to the system, along with an estimation of the certainty of this identification. The user can check the suggested species name(s), compare it to the collection of validated pictures on the portal, and possibly accept it and send it as a nature record. The NIA is also used as a preliminary step to the record validation process in this system, suggesting a pre-validation of the pictures to the expert person in charge of validation. Focusing on bird records, this poster presents the evolution of the number of collected data and validated data

for birds and the impact on the quality of the data. We also assess the added value of using such a NIA to increase engagement of new users in collecting bird records in the field.

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Deployment of acoustic monitoring networks to maximize detectability, with the example of the Pygmy Owl

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An acoustic monitoring network is a system made up of acoustic stand-alone devices working together toward one common goal: the monitoring of bird species. For instance, we acoustically monitor Pygmy Owls *Glaucidium passerinum* in Swiss forests. For a region of interest, the deployment of a large but finite number of devices to maximize species detectability implies to carefully determine each device location. We address this issue by considering an occurrence probability map based on a priori knowledge of species distribution relying on habitats. Based on this map and accounting for sound propagation, we apply optimization algorithms to compute all device locations. The acoustic coverage is then maximized with respect to detectability for a given number of devices, or a (almost) full coverage is sought by optimizing the number of devices. Our tool is a requirement for efficient and scientifically founded acoustic monitoring network planning.

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Using bioacoustics to assess the presence and species richness of owls and woodpeckers in two differently managed Alpine forests

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Woodpeckers and owls are considered important forest naturalness indicators and their presence reflects those of numerous other forest-dwelling species. Because of their habits and behaviour, they are often difficult to detect, and therefore the implementation of the bioacoustics discipline is suited to the survey of such taxa. In the present study we collected data about the presence and species richness of owls and woodpeckers in relation to the main forest structure and composition variables (basal area, dominant height, tree species diversity, living trees' vegetational conditions, canopy closure percentage, total deadwood volume, decomposition stage) in two forest sites which share similar ecological characteristics, but differ in terms of management: Cajada (non-intensively managed) and Tovanella (abandoned). Both Cajada and Tovanella forests report the presence of bird species belonging to the taxa of woodpeckers and owls. The main explanatory factors for the higher number of contacts of woodpecker and owls in Cajada rather than in Tovanella are the decomposition stage of deadwood and the level of canopy closure. Management practices in Tovanella have been only recently abandoned we think that our results might change in the future. Therefore, further research is needed, also to better assess how sustainable forest management might conserve key forest feature which are crucial for the thriving of most demanding owls and woodpeckers.

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Video-monitoring of Dalmatian Pelican *Pelecanus crispus* on Skadar Lake

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Dalmatian pelican colony on Skadar Lake is notoriously difficult to monitor due to natural obstacles and ephemeral character of the breeding location. After the adoption of artificial platforms planted within a conservation project since 2014, their breeding location became permanent and provided the opportunity to install a web camera. This presentation shows our experience with such monitoring solution and emphasizes its technical and ecological values and drawbacks.

Ecology

41

Habitat management and reproductive success in the Red-backed Shrike through a structural vs. functional habitat lens

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Human land-use is a fundamental element to consider for understanding habitat selection in birds, as it may affect the correlation between settlement cues and the quality of a habitat, in particular for breeding habitat. This can lead to maladaptive habitat selection, known as an ecological trap. When planning species conservation management actions, the focus is usually on restoring structural habitat (e.g. vegetation types). However, structural habitat may deviate from the functional habitat encompassing all ecological resources for the target organism. This is key to the resource-based habitat concept, which defines habitat in a functional, bottom-up way from the perspective of a particular organism. Here, we address this structural vs. functional habitat approach in the case of the Red-backed Shrike (RBS) *Lanius collurio* (L., 1758), a migratory grassland bird under active management in Europe that has been shown to be sensitive to maladaptive habitat selection. In this study, we focus on semi-natural grassland habitats created by different management regimes and their consequences for RBS habitat selection and reproductive success. In spring and summer 2020–2021, we followed over 200 RBS territories and assessed reproductive success (brood size, nestling condition, fledging success). In and around each territory, we monitored management actions through the whole breeding season. We also studied hedgerow vegetation structure and its relationships with the microclimate nearby nests. We will present preliminary results on how management regimes differently affect the birds' breeding success and will discuss both a structural and functional habitat viewpoint addressing also field data on prey availability, predation risk and RBS hunting behaviour.

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Where are the safe places for Grey Partridges? – Landscape context of predator activity

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Grey Partridges *Perdix perdix* are critically endangered in Germany due to drastic population declines. Together with habitat loss and a lack of insect food for the chicks, the main reason are high predation rates, especially during the breeding season. This is not only due to high predator populations, but

primarily because of changes in landscape structure. Due to the loss of structurally diverse landscapes, partridges and predators concentrate in the few remaining suitable habitats or partridges breed in unfavourable locations. High-intensity predator control is often not possible or not desired in Germany. Therefore, the aim must be to manage landscapes in a way that offers good habitats for partridges and reduces predation to a level that does not endanger the partridge population.

In my doctoral thesis, I use camera traps to investigate which parameters influence the activity density of predators in five types of vegetation: flower strips, field edges, hedges, grain fields and rapeseed fields. Parameters include the distance to forests, settlements, field edges and hedges and the proportion of these habitats within 500 m around the cameras. The activity density of predators is a proxy for predation risk and can be used to develop recommendations for the optimal placement of conservation measures.

Data for the 2019 and 2020 breeding seasons show that flower strips were much less frequented by predators than field edges and hedges and predator activity density increased the closer you get to a field edge or forest. These results confirm the effectiveness of flower strips and show that they ideally should be placed at some distance from forests and field edges. I am currently carrying out further analyses regarding the relative importance of factors, with a focus on flower strips and with data for the winters 2019/20 and 2020/21, and will present the results in my talk.

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Adult sex ratio in duck breeding populations in Třeboň Biosphere Reserve

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The adult sex ratio of waterfowl often shows male bias. These male-biased populations could have significant consequences for the population dynamics, viability, demography and could relate to line of physiological or behavioural marks because of male bias populations are more common endangered. The main affected and most studied duck species with higher proportion of males in breeding populations is Common Pochard *Aythya ferina*. This species showed a significant decline in numbers over the last 30 years and due to that was included among Vulnerable species in Red List of IUCN.

Data sets included females and males of six common duck species on 175 fishponds between 2004 and 2020 in Třeboň Biosphere Reserve (South Bohemia, Czech Republic). The census is based on the monitoring of duck females prior to their incubation, which allows selection of a suitable counting time for females and thus minimizes the risk that the female will be attended on the nest at the time of counting.

We formulated three predictions based on earlier hypotheses and on previous findings. (1) We expect long-term decrease in proportions of females in the breeding population of the Common Pochard and the Tufted Duck *A. fuligula*. Further, (2) we anticipate effect of population size on adult sex ratio. (3) Climate conditions (expressed by the NAO index) of the previous winter such should affect the condition of females, respectively female mortality.

The long-term decrease in the proportion of breeding females was found in Gadwall *Mareca strepera*, Mallard *Anas platyrhynchos* and Common Pochard populations. Increase was found in Common Goldeneye *Bucephala clangula* population between 2004 and 2020. A negative relationship between population size and female proportion was found in Gadwall and Red-crested Pochard *Netta rufina*. The proportion of breeding females of Tufted Duck was the only negatively affected by climate conditions previous winter.

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Corn Bunting local dialect pattern in intensive arable landscapes

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The song of the Corn Bunting *Emberiza calandra* was analysed to investigate the link between anthropogenic habitat degradation and its impact on the local dialect pattern, which consists of local groups of males sharing the same dialect, with distinct boundaries.

More than 400 territorial males were recorded in Belgium (low density and declining population in intensive arable landscape), France (low density in intensive arable and extensive meadow landscapes) and Poland (high density in extensive arable and meadow landscape).

As Corn Bunting males tend to have a clustered distribution, groups of acoustically interacting birds were spatially delimitated in order to measure the song-sharing level within those groups. Dialects and song-types were visually identified with the sonagrams.

In Belgium and in France, populations are fragmented, dispersed, with low territory densities, compared to Poland, where the species is omnipresent and abundant in all suitable habitats.

The analysis showed a low song-sharing within groups in Belgium, compared to the two other regions. However, few groups still have a local dialect pattern, with almost all males sharing the same dialect. Song sharing also occurred at lower distances in Belgium. This disturbed spatial song variation structure seems to be the result of a long process, probably more related to the decline of the species in this country, due to intensive farming.

Results also showed that the higher the territorial male density, the more homogeneous are the repertoires of all males within a group. This pattern corresponds to the local dialect formation, supporting the hypothesis of a density-dependent phenomenon. However, this relationship was found only in arable habitats.

Those results suggested that, in a population suffering a dramatic decline, there is a necessity to take also into account song features, here the local dialect pattern, as indicator of a wealthy population in conservation efforts.

[cancelled]

Wintering habitat modeling of Eurasian Black Vulture and Eurasian Griffon in Uttar Pradesh, India

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Cinereous Vulture *Aegypius monachus* (Linnaeus 1766) and Griffon Vulture *Gyps fulvus* (Hablizl 1783), CV and EG, respectively, are non-breeding visitors in Uttar Pradesh, a northern state of India. Their habitat and distribution have not been sufficiently studied in the state. Therefore, this study aims at finding out their potential habitat using species distribution modelling. Eight successful models (ANN, CTA, GBM, GLM, MARS, MaxEnt, RF and SVM) were developed which differed significantly in expanse of suitability area and model performance parameters. There is a view that none of the individual models can be considered as the best. Therefore, an ensemble of these models was also developed to overcome this problem since it extracts advantages from all the component models. As per the performance indicators, like AUC, TSS and Kappa values, ANN, CTA, MaxEnt, SVM and RF were found to be inferior models for GV while the remaining models were found to be acceptable. For CV all models were accepted based on model performance. However, during ground verification, for both species, MARS was placed in the inferior model category and the ensemble was found overall the best. The top two vital habitat determining variables as per the ensemble model were NDVI, bio13 (precipitation of the wettest month), for both vultures. The most vital temperature variable for GV was bio08 (Mean temperature of the wettest quarter) and bio09 (Mean temperature of the driest quarter) for CV. Tarai ecozone showed the highest amount of suitable area for both followed by Vindhyan-Bundelkhand and almost negligible suitable area in the Gangetic plains and Semi-arid ecozone. Tarai ecozone with higher rainfall and moist

deciduous forests was the most favourable habitat for both the species. Among the two, CV had more suitable area than GV in the study area. Agricultural areas were found to be largely unsuitable, though sporadic presence was recorded. Total suitable area for the two were 49,000 km^2 (CV) and 37,000 km^2 (GV) out of the available 240,928 km^2. Suitable area can be used for vulture conservation by adopting different strategies such as, improving animal husbandry for providing sufficient foraging materials. Simultaneously, destruction of forest habitat and decrease in foraging materials need to be arrested in and around these areas.

[cancelled]

Changes in bird communities throughout secondary succession of oak forest in south-western Belarus

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The article tracks the changes in the bird population during secondary succession of cleared oak forest. The fieldwork was performed in the years 1996–2018 applying the conventional bird count methods. The study revealed that the bird species diversity in the course of succession (6 stages, 1–150 years old) increased from 10 to 58 species, total abundance – from 153.2±1.45 to 1128.9±1.81 birds/km². The ornithological diversity included six faunal types. At the initial stages of succession the bird population comprised the European, European-Turkestan, Afro-Eurasian and Palearctic types of fauna. At the stage of 120–150 years old the species structure (50.0%) were dominated by the Palearctic types of fauna, and the bird population (48.0%) was dominated by the European types of fauna.

[cancelled]

Spring migration geese of genus *Anser* on the territory of Polissya and Forest-Steppe zone of the Leftbank Ukraine

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Geese of genus *Anser* are the most numerous spring migrants in Ukraine. They migrate along ecological corridors as well as in wide front over the whole country. Our studies were focused on the particularities of their migration on the territory of Polissya and Forest-Steppe zone of the Leftbank Ukraine. Observations were conducted in Kyiv, Poltava, Chernigiv and Sumy regions during 2007–2018 in daylight time in different biotopes. Four species of genus Anser were recorded. *Anser albifrons* was dominant which can form polyspecies flocks mixed with *A. fabalis* though the last one forms its own flocks but too rare. Rarer are the flocks of *A. anser*. *A. erythropus* was observed only once. The spring migration begins on average in the second decade of March (M=15.III, n=36) and stops in the second-third decade of April (M=15.IV, n=12). The limits are 27.II–9.V but on average migration lasts one month. In total 197 flocks and 10,952 birds were recorded. The number of birds in flocks varied between 2 and 296, the average size was 55.6±3.4 and CV=85.7% (n=197). The most popular were the flocks up to 80 birds. The main direction of the migration was to the North-East (29.5% of the whole flocks). Nearly equal were directions to the East (15.5%) and the South-East (13.5%), the Northern and North-Western were equal (11.9%). Sometimes the geese form numerous gatherings on the sites where food is sufficient and there is no disturbance. The size of such gatherings varies between some hundreds and 7–8 thousand birds.

Data presented are previous and do not pretend on completeness, but are very important addition to the general picture of migration movements in the studied region.

Conservation

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Behavioural responses to flight diverters on powerlines – Evidence from a BACI design study with a dedicated avian radar

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Growing human population demands the expansion of the energy transmission grid. Power lines represent a major death hazard for many bird species. Addressing such a human-wildlife conflict requires detailed knowledge of how species use the aerial space and how they react to mitigation measures, such as flight diverters (hereafter markers). Here, we use dedicated avian radars to investigate the effect of wire marking on the density of bird tracks and flight behaviour at increasing distance from the powerline within a Before-After-Control-Impact (BACI) design. We found that (i) the density of bird tracks decreased in the area after the construction of the powerline but only at the marked section and further than 50 m from the powerline. Also, although the density of tracks was similar before and after construction within 50 m of the powerline, (ii) those tracks found there were, on average, at higher height after than prior construction. Furthermore, we found (iii) larger proportion of tracks gaining height (hereafter upwards) after compared to prior construction, especially further than 150 m from the powerline but only at the marked section, (iv) higher multidirectionality in the tracks flying within 100 m from the marked section of the powerline after construction compared to prior construction, and (v) larger proportion of tracks flying perpendicular to the powerline within 50 m of the unmarked section after construction than prior construction. Our findings, thus, provide evidence of birds' responses to flight diverters on a powerline both by avoidance behaviour and responses during flight. Furthermore, we highlight the adequacy of dedicated avian radars to assess the efficiency of interventions mitigating the impacts of overhead energy infrastructure (e.g. power lines, wind turbines) on the use of the aerial space by animals.

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LIFE with Vultures: monitoring and conservation of Griffon Vultures in Cyprus

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The Griffon Vulture *Gyps fulvus* was historically common and widespread in Cyprus, but today the species is on the brink of extinction, with around 20 free-flying birds and just 1–3 nesting pairs. Past conservation efforts included population monitoring, reinforcement of the local population with translocated birds from Crete and establishment of feeding stations. Following initial success, poisoning incidents undermined these efforts and the population continued to decline while nesting activity remained low. In order to reverse these trends, a sound understanding of their drivers is needed. Data and information related to historical Griffon Vulture population size and vital rates for Cyprus were collated for Population Viability Analysis modelling. Under current conditions, the Cyprus Griffon Vulture is predicted to go extinct within 15 years, largely driven by frequent poisoning incidents. If this would happen, the valuable Ecosystem Services that this species provides, in terms of tourism revenue and scavenging functions, and which have been calculated for Cyprus for the first time, would vanish. A set of scenarios were developed to explore which management interventions are likely to be effective for creating the necessary conditions for the population to increase and persist in the long term. Population monitoring and GPS tracking of four individuals identified the foraging and core ranges of the population, which are restricted to the south-west of the island, while analysis of movements enables geographical targeting

of conservation activities. The results of the above-described work, inform actions on the ground in the context of “LIFE with Vultures”, an ongoing four-year (2019–2023) EU-funded species conservation project. Human-wildlife conflict was identified to be at the heart of the Griffon Vulture decline in Cyprus and conservation efforts operating on multiple levels are needed in order to tackle the complex threats faced by the species.

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Identification of marine protected areas for Audouin’s Gull in Croatia

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The Audouin’s Gull *Larus audouinii* (AG) breeds on several small, uninhabited off-shore islands in the Lastovo archipelago in the Croatian part of the south Adriatic Sea. The national breeding population is estimated to be 29 to 38 pairs, based on the results of the three year annual survey from 2019 until 2021. Islands with AG colonies are legally protected (as a Nature Park and are part of the EU NATURA 2000 ecological network), but due to lack of data only narrow sea areas around islands and in between islands in the archipelago are designated as conservation areas important for birds. Protected areas for colonial birds should not only include breeding grounds, but also foraging areas. In the period between 2019 and 2021, 25 incubating AG adults were equipped with a GPS-GSM solar-powered tracking device. Here we are presenting how those tracking data were used to identify important feeding areas at sea for the AG. By using the Kernel Density Estimation (KDE) we were able to define the sea area used by individuals marked with GPS loggers. We identified a unique home range as 95% KDE and 50% KDE as core foraging areas. Core foraging areas encompass Lastovo channel, Neretva channel, Malo more and Mljet channel, all outside currently protected areas. Those areas should be designated as new marine protected areas of importance for bird conservation to provide the basis for adequate species conservation.

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Bird monitoring in the Grande Cariçaie’s nature reserves and their lessons for wetlands management

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Home to close to a quarter of the fauna and flora of Switzerland and highly attractive for birds, the wetlands of the “Grande Cariçaie” nature reserves are under management since the early 1980s. Erosion of the shore and forest progression inside the marshes are the main threats to this area. A dedicated program of transect-based surveys is performed since 1985 to evaluate the performance of the mowing strategies applied to the wetlands in regard to bird abundance. Since the early 2000s, complete surveys of the avifauna of the nature reserves are undertaken annually, following a special program of the Swiss monitoring scheme. Here we provide an overview of the monitoring programs in the Grande Cariçaie and some key informations regarding mowing strategies and other conservation measures applied in these wetlands of national priority concern.

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Research on bird conservation and Natura 2000: a review

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As birds are a taxonomic group of major interest in the EU Directives, this review investigates the characteristics of the scientific research dedicated to birds in relation to Natura 2000, focusing on the scale, distribution, aims and main attributes of the publications and the targeted bird species. Our review focuses on 169 peer-reviewed articles, published between 1995 and 2019. Most studies concern terrestrial habitats, particularly wetlands. The terrestrial Mediterranean biogeographical region and marine Atlantic region have the greatest number of publications, while Spain is the country with the highest number of related articles. The number of publications is correlated to Natura 2000 coverage at both country and biogeographical region level, but it is not significantly correlated to the distribution surface area of the studied bird species or to the coverage of each habitat type within Natura 2000 sites. Bird species are studied mainly at a community or single species level (mainly Passerines), with focus on their distribution and occurrence. Both Annex I and non-Annex I bird species are examined in the literature, with most species having decreasing population trends at the European scale. Future research on bird conservation and Natura 2000 should focus on habitats that have received less attention despite their important role in a changing future, such as the alpine and urban types. Moreover, future studies should address those species for which status and trends are still not thoroughly investigated. Finally, since there are still some knowledge gaps about the Natura 2000 implementation, it would be of importance to enhance the research efforts about conservation status and conservation effectiveness in relation to the network.

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Threat status and changes in Red List Indices of the breeding birds according to two IUCN National Red List assessments for Estonia

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The first Estonian Red Book was compiled as early as 1976–1979. The fifth National Red List Assessment for birds took place in 2019. During this period, the principles for compiling Red Lists have changed for several reasons. Since 2008 the IUCN Red List Criteria (version 3.1) are used for a national assessment of the status of different taxonomic groups in Estonia, including birds. Of the 213 species regularly breeding in Estonia, 96 (45%) were classified as threatened in the last assessment. Of those species, 23 were assessed as Critically Endangered (CR), 31 Endangered (EN), and 42 Vulnerable (VU) in Estonia. The category Least Concern (LC) was assigned to 103 species (48%).

The number of threatened species increased drastically compared to the assessment carried out in 2008 (35 species). The decline of the Red List Index (RLI) value for birds between 2008 (0.8582) and 2019 (0.7352) shows that the overall status of the breeding bird fauna has become worse. For waterbirds (–0.2078) and farmland birds (–0.1543), the changes in RLI were the largest. Also for waders (–0.1100), mire species (–0.1111), and coniferous forest specialists (–0.1000), RLI values showed a significant decline. For the birds of prey (–0.0640) and deciduous and mixed forest specialists RLI (–0.0643), the change was smaller but still negative.

The largest changes (LC to CR) in threat categories occurred for Velvet Scoter *Melanitta fusca*, Turtle Dove *Streptopelia turtur* and Yellow Wagtail *Motacilla flava*. The categories of the Common Eider *Somateria mollissima* and Hen Harrier *Circus cyanus*, which previously belonged to the category of Near Threatened (NT), also changed to CR. A new trend is the transformation of common species, such as those with a relatively large population, into threatened species such as Common Snipe *Gallinago gallinago*, Barn Swallow *Hirundo rustica*, Redwing *Turdus iliacus*, etc.

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Structures combined with biodiversity priority areas have a positive impact on various bird species: example from Farnsberg (BL)

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Since decades structural rich orchards are disappearing in Switzerland, and with them native species such as the Red-backed Shrike *Lanius collurio* and the Common Redstart *Phoenicurus phoenicurus*. One of the reasons of the decline is the lack of structures in the agricultural landscape. Since 2004 BirdLife Switzerland, around 30 farmers and other partners are undertaking a project at Farnsberg (Canton Basel Landschaft) with the aim to increase the number of structures and combine them with biodiversity priority areas. Among other structures, more than 1,800 fruit trees, 4,500 bushes, as well as several piles of stones and branches have been established. Moreover, 26 hectares of extensive meadows have been created. Thanks to these conservation measures the number of breeding pairs of Red-backed Shrike at Farnsberg have more than tripled and five new pairs of Common Redstart were established. But those two are not the only species that are taking advantage of these conservation measures. In fact, other species have successfully bred for the first time in years in this area, for instance the European Honey-buzzard *Pernis apivorus* and the Eurasian Wryneck *Jynx torquilla*.

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Artificial sand walls as a temporary conservation measure for the Collared Sand Martin

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The Collared Sand Martin *Riparia riparia*, Europe's smallest swallow, is a colony breeder. In Switzerland it is listed as Vulnerable in the Red List of breeding birds and is one of the priority species for the Swiss bird recovery programme. Collared Sand Martins used to breed in steep banks of meandering rivers. In the last centuries rivers have been canalized and thus breeding habitats disappeared. In consequence Collared Sand Martins started to breed in gravel pits. Unfortunately, those alternative breeding sites are getting exploited more rapidly nowadays and consequently, are often no longer available.

As a consequence the number of individuals as well as the size of the colonies of Sand Martins declined in the last 50 years. To preserve this species, BirdLife Switzerland and partners developed an artificial sand mixture to build artificial sand walls where Sand Martins can breed and advise gravel pit operators where and how to establish them. In 2020, 91 breeding places were recorded for the Collared Sand Martin, 26 of them were artificial sand walls. Moreover, from the around 4,200 breeding pairs, almost 1,800 pairs bred in these artificial sand walls, which means more than 40% of the total population.

These artificial walls are an important measure for the conservation of this tiny swallow, but of course cannot replace its natural breeding places. To preserve the Collared Sand Martin, at least some rivers need to be restored with their natural meandering flow and the colonies breeding in gravel pits need to be protected consequently.

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The Swiss population of the Little Owl tripled due to Conservation measures in the last 20 years

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The Little Owl *Athene noctua* was a widespread breeding bird till the middle of the last century in Switzerland, with presumably more than 800 breeding pairs. From the 1950s the number of breeding pairs decreased dramatically reaching only about 50 to 60 breeding pairs in the early 2000s. This decrease was mainly due to habitat loss caused by the intensification of agriculture and the disappearance of orchards. The Little Owl is faithful to its territory. Therefore, it needs good hunting grounds with plenty of structures like trees, bushes, piles of branches and perching sites. To preserve the Little Owl, BirdLife Switzerland and partners started implementing conservation measures such as the planting of trees, the installation of nest boxes and the creation of extensive meadows with differentiated mowing regimes.

These conservation measures have been successful and led to an essential increase in the number of Little Owl territories, which have been estimated to be 153 in 2021.

Other

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Promoting ornithology and bird conservation

Manuel Schweizer[1,2], Valentin Amrhein[1,3], Raffael Ayé[1,4], Kurt Bollmann[1,5], Judith Hüppi[1], Irene Fuetsch[1], Peter Knaus[1,6], Fränzi Korner-Nievergelt[1,6], Beatrice Miranda[1], Mathias Ritschard[1,7], Tobias Roth[1,8], Martin Schuck[1], Barbara Trösch[1,6]

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Ala – Swiss Society for the Study and Conservation of Birds aims at promoting ornithology and bird conservation in Switzerland and abroad. The society organizes excursions, courses and symposia on various ornithological topics as well as on nature conservation. It publishes the quarterly journal “Ornithologischer Beobachter” which includes peer-reviewed scientific articles, and is involved in the management of 16 wetlands in Switzerland, some of them listed under the Ramsar Convention. Ala is a partner organization of BirdLife Switzerland.

Workshops

Pan-European Common Bird Monitoring (PECBMS)

Alena Klvaňová, Eva Šilarová, Anna Gamero, Petr Voříšek

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The workshop is an excellent opportunity to meet the network, share experience, get answers for your questions and learn what is new in bird monitoring on pan-European and national levels, or how to use the new online tools and forum. The coordination team will present a progress report and plans for the future, explain the concept of the International Census Plots programme or the brand-new site-level online tool. An essential part of the workshop will be an open forum dedicated to discussing the participants' issues. We have also invited external guests. For instance, Karine Princé (CESCO) will talk about collaboration with the European Commission, Enya O'Reilly (UEA) will present the European forest bird indicator development using the relative habitat use metric, Fränzi Korner-Nievergelt (Swiss Ornithological Institute) will describe the calculation of the Swiss Bird Index SBI®, and Henk Sierdsema will present new distribution modelling techniques..

The workshop is intended mainly for the national bird monitoring schemes coordinators but is open to all conference participants.

EuroBirdPortal: launch of the new Migration Mapping Tool and overall overview of the EBP project and its future developments

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The workshop will start with the official launch of the new Migration Mapping Tool. A new online tool, developed conjointly by EURING and the EBP for the European Food and Safety Authority (EFSA), that provides the most up to date information on the European-wide seasonal patterns of distribution and connectivity of the 50 bird species used by EFSA to monitor Avian Influenza in Europe. Then we will give an overall overview of the current state of the project and discuss the next developments with the partners.

The workshop is open to all conference participants.

EBBA2: updates and new developments

Petr Voříšek[1,2], Sergi Herrando[1,3], Verena Keller[1,4]

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16 months have elapsed since the publication of the European atlas book. How was it received? What has happened since? In the workshop we will present developments and follow-up activities at European but also at national levels. We will present the new online version of the European atlas, ongoing and planned research projects and discuss involvement of national coordinators.

The workshop is open to all conference participants.

Roundtable: The African Bird Atlas Project (ABAP) – European Ornithology's greatest need

Ulf Ottosson[1], Michael Brooks[2], Samuel T. Ivande[1]

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Africa's biodiversity provides critical ecosystem services. It contributes to the continent's economy and serves as a buffer to climate change. However, the continent is experiencing a dramatic loss of biodiversity even before we can fully document and enjoy the benefits of these natural resources. Integrating biodiversity considerations into policies is key for mitigating these losses, and data is critical for informed decision-making.

ABAP is the greatest need for European Ornithology. The final frontier for European ornithology is knowing where the birds that spend the northern winter in Africa currently go, and what they do. In addition to climate change, development in Africa, and especially the loss of natural vegetation through expanding agriculture, are having major impacts on the distributions of migrants, and on the timing of their migration. From the perspective of research and conservation needs in the African-Eurasian bird migration system, the largest information gap will be met by a continent-scale atlas project like ABAP.

Focusing on birds ABAP implements the protocol developed in the Southern Africa Bird Atlas Project 2 (SABAP2). It is designed to capture bird distributional data across wide spatial scales. Using multiple data entry points including the BirdLasser app, this citizen science project is exceptional in its ability to report current biodiversity changes and thus provide decision-makers with up-to-date information. In Kenya and Nigeria, implementations of atlassing have been found to be a very effective way to engage nature enthusiasts to becoming citizen scientists. The African Bird Atlas Project seeks to mobilize collaborative data among ongoing national projects across the continent to establish an up-to-date database for Africa's birds. It will also develop institutional capacity of all partners for managing and using the data to improve environmental management decisions, while connecting more people to nature. ABAP's success can be seen in the sustained growth of data coverage, including establishment of new country-level atlasses, and the development of user-friendly data summaries. Its impact can be measured through the inclusion of the data collected in driving key conservation management decisions throughout the continent.

The roundtable is open to all conference participants. It will set the starting point for the workshop in Sempach 9–10 April 2022 (by invitation only).

International Waterbird Census

Tom Langendoen, Szabolcs Nagy

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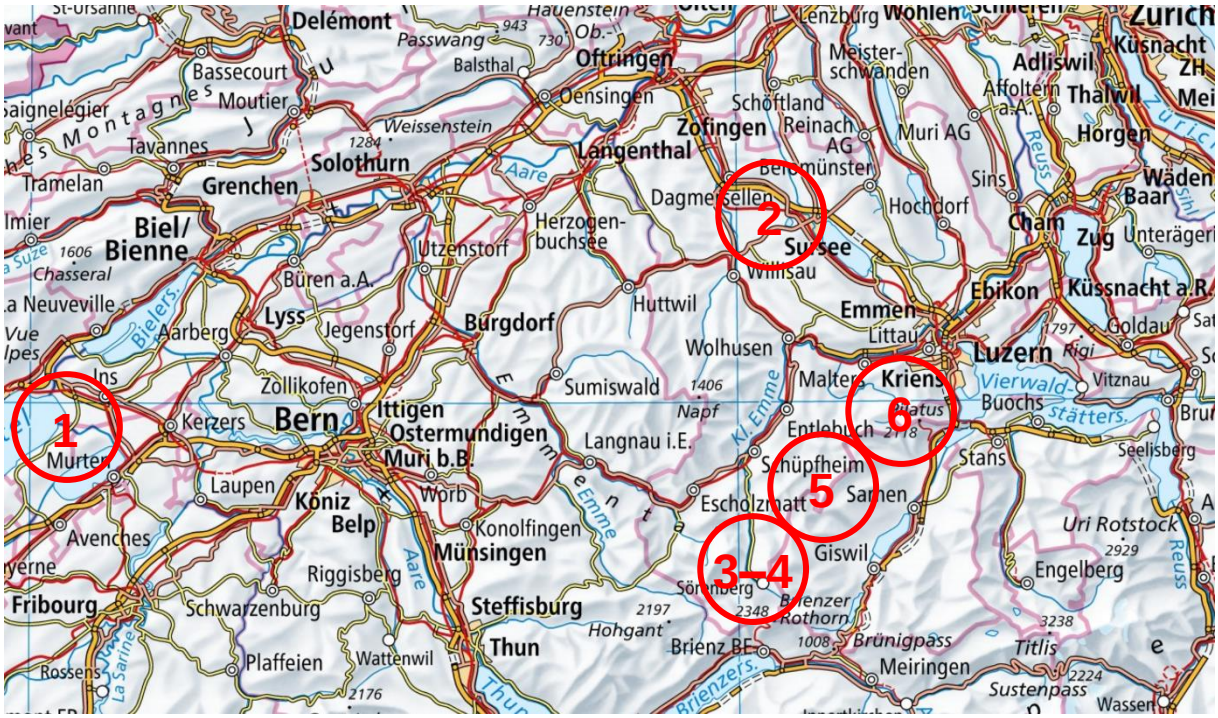
The International Waterbird Census (IWC) is held every January/February in 143 countries around the world. This workshop brings coordinators from Western Palearctic countries together to discuss recent and upcoming developments across the African-Eurasian Flyway and to share experiences on utilising the census data at national and international level. A coordinators representative to the Africa-Eurasian Waterbird Monitoring Partnership Strategic Working Group will also be elected during the workshop.

This workshop is principally for IWC national coordinators but others interested to join are kindly invited to contact Tom Langendoen.

Mid-conference excursions

Map 4 Overview



Legend

1 = Fanel and Chablais de Cudrefin

2 = Plain of Wauwil and visitor centre of the Swiss Ornithological Institute

3–4 = Sörenberg/Schrattenfluh massif

5 = Glaubenbergpass

6 = Mount Pilatus

1. Fanel and Chablais de Cudrefin

Known as one of the ornithological hotspots of Switzerland, the area of the Fanel and the Chablais de Cudrefin is a nesting, stopover and overwintering site for about 300 documented bird species. The site is situated at the northeast end of lake Neuchâtel and holds the largest Swiss colonies of Great Cormorants, Yellow-legged Gulls and Common Terns. The spacious reedbeds, extensive sedge marshes and diversely structured banks hold good populations of Savi's Warblers, Bearded Reedlings, Common Nightingales, and Common Cuckoos. Most heron, duck, and rail species use the area either as stopover and/or breeding site. The beginning of April is a great time for migrating shorebirds like Eurasian Curlews and several other waders, and the Fanel as well as the Chablais de Cudrefin are great spots for additional surprises among migratory species. The surrounding agricultural areas hold some of the last remaining populations of Corn Bunting and Turtle Doves in Switzerland. Several woodpecker species including Black and Middle-spotted Woodpecker breed in adjacent forests.

We offer two excursions to this spectacular site that cover the same locations but follow different routes. This excursion includes a two-hour drive per direction.

2. Plain of Wauwil and visitor centre of the Swiss Ornithological Institute

This excursion remains in Central Switzerland and includes a 45-minute drive. It is split in an outdoor and indoor part. As a nature reserve embedded in an otherwise agriculturally managed area, the plain of Wauwil remains one of the most species-rich areas on the Swiss Plateau. Due to conservation efforts, the plain holds important populations of open and wet farmland birds, including the largest Swiss colony of Northern Lapwings, but also serves as an important stopover site for migratory bird species, especially during spring migration. Species may include White Stork, Red and Black Kite, Water Rail, Alpine Swifts, European Stonechat and several wader species. At the beginning of April, the site is great for migratory birds in general and may provide other highlights like Jack Snipe, Bluethroat, and many more. Excursion leaders will also talk about the area's various conservation efforts under the lead of the Swiss Ornithological Institute.

After lunch, a second part will then lead to the visitor centre of the Swiss Ornithological Institute. The visitor centre includes – among others – a state of the art, interactive exhibition called "survival" on the ecology and requirements of birds and a splendid documentary on Birds in Switzerland. The visitor centre welcomes roughly 40,000 visitors per year and was awarded the Sustainability Prize of the European Museum of The Year Award 2017.

3.–4. Sörenberg/Schrattenfluh massif

As part of the UNESCO biosphere reserve Entlebuch, the Schrattenfluh massif is part of a diverse landscape of moorland and subalpine forests and impresses with a rapidly emerging karst scenery and a diverse fauna. The area may provide sightings of montane species like Black Grouse, Citril Finch, Spotted Nutcracker, Ring Ouzel or Eurasian Three-toed Woodpecker as well as Common Crossbill and European Crested Tit. The open plains in between forest patches may, depending on snow cover, provide good numbers of migrating alpine species such as Northern Wheatear or Water Pipit. Several alpine bird species such as Alpine Accentor and Water Pipit inhabit the southerly exposed part of the massif. With some luck, you may also spot Golden Eagle, Crag Martin or White-winged Snowfinch.

Although following a cleared winter path, this excursion should only be attended by participants in good physical condition and with proper footwear. The entire route will cover 8–10 km and about 400 m in elevation. We therefore advise you to only participate when walking this distance and elevation does not present a problem for you. Please be responsible for your own sake and for the other participants. This excursion includes a drive slightly over an hour per direction, and about five hours of hiking and birdwatching.

5. Glaubenbergpass

A second excursion to the UNESCO biosphere reserve Entlebuch leads to the Glaubenberg, the largest mire landscape of Switzerland. The montane forests are inhabited by secretive species like Western Capercaillie, Hazel Grouse, Eurasian Woodcock, Eurasian Three-toed Woodpecker but also Common Crossbill, Crested Tit and Alpine Tit, one of two forms of Willow Tit in Switzerland. The adjacent open areas allow regular sightings of Citril Finch and Black Grouse, as well as Ring Ouzel and may, under favourable conditions, provide good numbers of alpine migrants such as Water Pipit.

The excursion should, although following a cleared winter path, only be attended by participants in good physical condition. The entire route will cover approx. 5 km and about 300 m in elevation. We therefore advise you to only participate when walking this distance and elevation does not pose a problem for you. Please be responsible for your own sake and for the other participants and only join with proper footwear. This excursion includes a drive of about an hour per direction, and about five hours of hiking and birdwatching.

6. Mount Pilatus

Mount Pilatus is the mountain massif overlooking Lucerne. Due to its elevation, Mount Pilatus houses montane as well as truly alpine species, including a population of Alpine Ibex and Chamois, but also a rich avifauna. The excursion will visit both the alpine and lower-elevation areas of the site. After a drive of about 20 minutes, you will take the cable car to the peak of Mount Pilatus (2128 m asl) and look for alpine species. The rugged, rocky top of Mount Pilatus holds true alpine species like Rock Ptarmigan and Alpine Accentor. Alpine Choughs are omnipresent and can be observed at short distance around the top. Thereafter, you will take the cable car back to lower altitudes (approx. 1400 m asl), where the mosaic of dense forest and grassland houses species like Common Crossbill, Eurasian Three-toed Woodpecker, Citril Finch, Crested Tit and Alpine Tit, one of two forms of Willow Tit in Switzerland.

The excursion should, although following only accessible paths depending on the snow situation (a total of approx. 4 km), only be attended by participants in good physical condition. We therefore advise you to only participate when walking this distance and elevation does not pose a problem for you. Please be responsible for your own sake and for the other participants and only join with proper footwear.

Mount Pilatus, view from the conference venue. Photo: Verena Keller

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