

5th meeting TFRB, 19 April 2024

Turtle Dove Adaptive Harvest Management mechanism

March 2024 Technical update (central-eastern flyway)¹

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1. WHAT IS NEW IN THE 2024 UPDATE

The spring 2024 technical update on the Turtle Dove AHM mechanism provides new population data from the Pan-European Common Bird Monitoring Scheme (PECBMS), this time covering up to the breeding seasons of 2022 and 2023. Thus, we present quantitative information on the population estimates corresponding to the first two breeding seasons since the TFRB recommended significant reductions in hunting (50% of the 2013-2018 baseline in 2021 and zero take in 2022); in the same period, there was a complete hunting ban in place in the western flyway.

Unfortunately, there are still no data on turtle dove demographic parameters coming from studies carried out in countries that form part of the central-eastern flyway, despite the repeated recommendations of the Task Force on this issue². This continues to hamper the possibility of using population modelling tools based on parameters that are specific to this flyway, which in turn creates high uncertainties on the impact of hunting on this flyway.

2. MAIN RESULTS AND CONCLUSIONS

The updated PECBMS data 2000-2023 show that the turtle dove breeding population size in the central-eastern flyway declined continuously between 2003 and 2023. In the spring of 2023, the population size reached its lowest level of the entire time series, at 0.56 million breeding pairs (560,000 bp). The total loss is of 0.48 mbp, or 46% of the previous population, over a period of 21 years.

¹ Document prepared in the frame of the service contract with the European Commission “Supporting the recovery of bird species of Annex II of the Birds Directive in non-secure conservation status” (09.0201/2022/886665/SER/D.3) in preparation for the December 2023 meeting of the Task Force on the Recovery of Birds (01/12/2023).

² See Summary Record of the First meeting of the EU Task Force on the Recovery of Birds, 18 March 2022 (<https://circabc.europa.eu/ui/group/e21159fc-a026-4045-a47f-9ff1a319e1c5/library/06e64616-f8d2-40b7-83ce-e07ecac48db6/details>) and Minutes of the 3rd meeting of the EU Task Force on the Recovery of Birds, 21-22 March 2023 (<https://circabc.europa.eu/ui/group/e21159fc-a026-4045-a47f-9ff1a319e1c5/library/0e56f0b2-707c-47d7-b554-134192ff1405/details>)

In line with the continued decline, the 10-year trend, measured by the PECBMS multiplicative slope, worsened from “stable” to “moderate decline”. This is the opposite situation to the western flyway, where the 10-year slope has improved from “moderate decline” to “stable”.

3. FLYWAY-SCALE POPULATION DATA (PECBMS)

The PECBMS turtle dove dataset, updated in 2024, refers to the breeding seasons of 2000 to 2023. The results show that the population in the central-eastern flyway continues to decline progressively, with no sign of potential recovery, particularly in recent years. Turtle dove numbers in this flyway fell from a maximum 1.04 mbp in 2003 to 0.56 in 2023, the lowest estimate of the time series; this represents a total loss of 0.48 mbp, or 46% of the 2003 figure, over this 21-year period. This situation contrasts with that observed in the western flyway (see Figure 1), where the population has increased following the implementation of a temporary hunting moratorium since 2021.

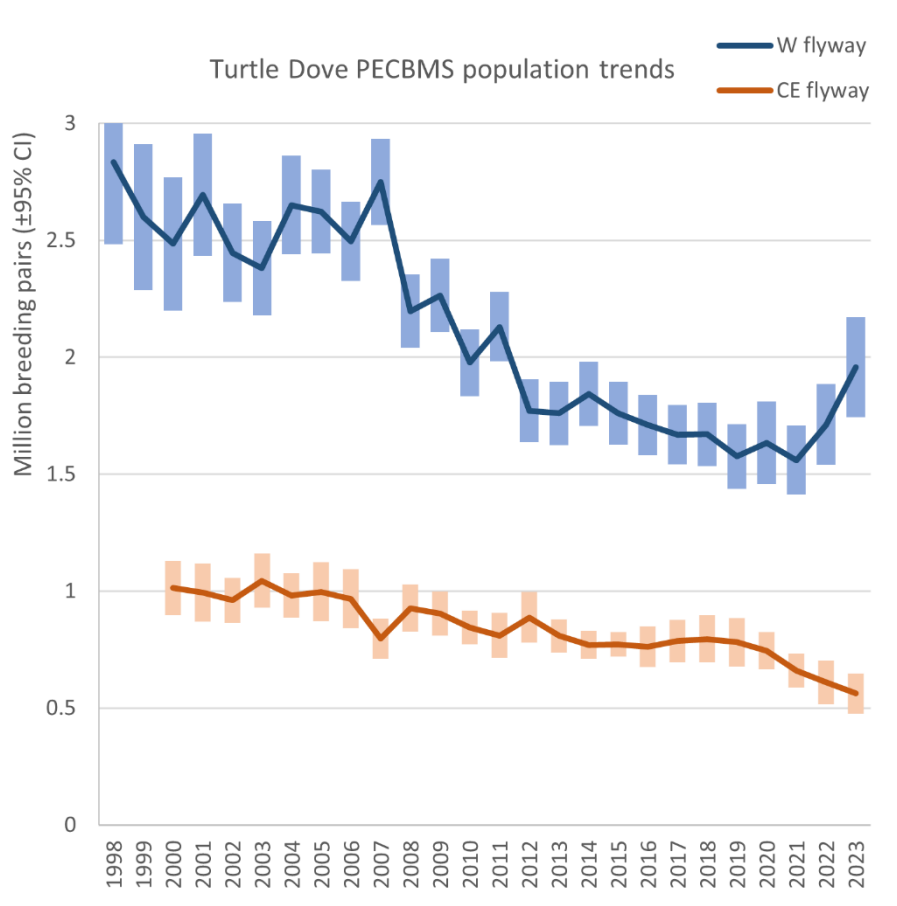


Figure 1. Estimates of turtle dove breeding population size along the European part of the western flyway 1998-2023 and central-eastern flyway 2000-2023. Estimates of numbers of breeding pairs in each flyway were calculated by combining information on annual variations in national bird count data during surveys and information on population sizes reported by national authorities in the latest Art. 12 process. Error bars indicate 95% confidence intervals. Data: PECBMS (February 2024).

Correspondingly, the 10-year multiplicative slope for the central-eastern flyway decreased in 2014-2023 (0.968 ± 0.014 95%CI) with respect to 2012-2021 (0.988 ± 0.013 95%CI), with the trend worsening from *stable* to *moderate decline* ($p < 0.01$) (Fig. 2). In the western flyway, by contrast, the 10-year slope increased after two years of moratorium to 0.999 ± 0.011 95%CI (2014-2023) from a pre-ban estimate of 0.983 ± 0.010 95%CI (2012-2021). This meant that the western flyway 10-year trend improved from *moderate decline* to *stable*.

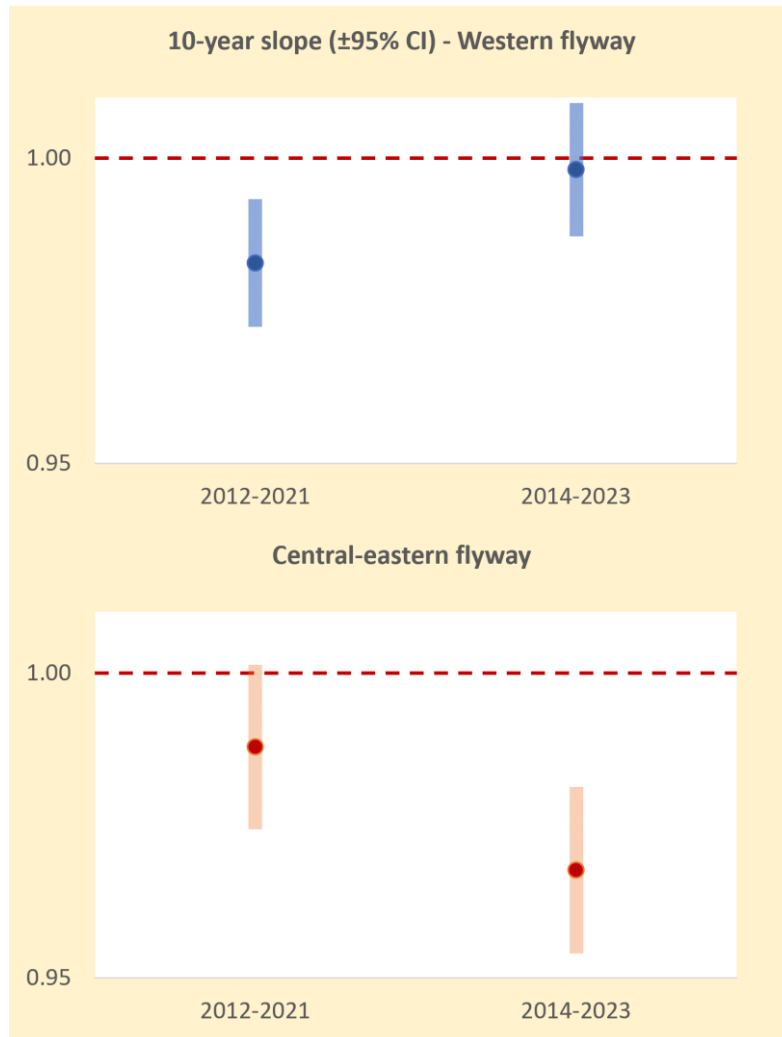


Figure 2. 10-year multiplicative slopes for both flyways corresponding to the periods 2012-2021 and 2014-2023 with their 95% confidence intervals. The red dotted line marks population stability ($\lambda = 1$). As explained in the text, in the western flyway, the 10-year slope has improved from moderate decline (confidence interval lower than 1 but higher than 0.95) to stable (confidence interval crosses 1). In the central-eastern flyway, the opposite situation occurs, with the 10-year slope worsened from stable to moderate decline. Data: PECBMS (February 2024).

The quick population response to the hunting ban observed in the western flyway is in line with the predictions of the population models of Bacon *et al.* (2023)³ and de Vries *et al.* (2022)⁴ that improving the survival of adults and juveniles, the vital rates to which population growth is most sensitive, would bring immediate effects at population level. There, the population has shown capacity to recover almost immediately and, even if this process may at some point be slowed down by density-dependence, it demonstrates that by prioritizing action to address unsustainable hunting it is possible to buy time to undertake more lasting interventions on habitat.

The measures taken so far to reduce hunting pressure have not been as drastic in the central-eastern flyway as in the western flyway, and this is the most likely reason behind the observed difference in population trends. Both populations are known to overlap in Africa during the wintering season⁵ and are, therefore, probably subject to similar conditions outside of the breeding grounds.

³ Bacon, L., Guillemain, M., Arroyo, B. *et al.* *Predominant role of survival on the population dynamics of a threatened species: evidence from prospective analyses and implication for hunting regulation.* *J Ornithol* **164**, 275–285 (2023). <https://doi.org/10.1007/s10336-022-02038-4>

⁴ de Vries, E.H.J., Foppen, R.P.B., van der Jeugd, H. and Jongejans, E. (2022), *Searching for the causes of decline in the Dutch population of European Turtle Doves (Streptopelia turtur).* *Ibis*, 164: 552-573. <https://doi.org/10.1111/ibi.13031>

⁵ Schumm, Y.R., Metzger, B., Neuling, E. *et al.* *Year-round spatial distribution and migration phenology of a rapidly declining trans-Saharan migrant—evidence of winter movements and breeding site fidelity in European turtle doves.* *Behav Ecol Sociobiol* **75**, 152 (2021). <https://doi.org/10.1007/s00265-021-03082-5>

1- ANNEX 1. PECBMS METHODOLOGY FOR ESTIMATING FLYWAY INDICES

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1.1 Introduction

The PECBMS project office calculated indices and trends for both Turtle Dove flyways (western and central-eastern) from the PECBMS data. PECBMS national coordinators were requested to deliver data till year 2023 when possible. National coordinators put big effort to deliver as up-to-date data as possible, so we obtained data till year 2023 for most areas. Thus, out of 26 countries or regions, 19 delivered data till 2023 and 7 countries/regions delivered data till 2022. The allocation of countries to flyways was the same as in former years, the only change was that Cyprus was newly added to the Central-Eastern flyway. The final dataset was divided according to the flyways. Indices were calculated with the tool RSWAN, which is used for European index calculation. Its advantage is a stepwise completion of countries into regions and then to European level.

Permit for data provision was received from the national coordinators on 3.12.2020. All countries agreed to provide data.

1.2 Methods

1.2.1. Input distribution and preparation for rswan analyses

Two indices were calculated, one per flyway, according to the country distribution within flyways in the proposal (Table S1).

The final allocation of countries to flyways and year of latest data is as follows:

Central-Eastern flyway:

2023: BG, HR, CZ, EE, HU, IT-CE, LV, PL, RO, SK, SL

2022: AT, DE-CE, GR, LT

Western flyway:

2023: BE-WAL, FR, IT-W, PT, ES, CH, GB

2022: BE-FLA, DE-W, NL

Table S1. Distribution of countries per flyway, and last year of data available per country.

Country	Abbreviation	Flyway	Final year	Comment
Bulgaria	BG	central-european	2023	
Croatia	HR	central-european	2023	
Cyprus	CY	central-european	2023	Cyprus was added in the 2024 Report for the first time.***
Czech Republic	CZ	central-european	2023	
Estonia	EE	central-european	2023	
Hungary	HU	central-european	2023	
Italy_CE	IT-CE	central-european	2023	Italian data were specifically calculated for 2 parts according to the proposal. **
Latvia	LV	central-european	2023	
Poland	PL	central-european	2023	
Romania	RO	central-european	2023	
Slovakia	SK	central-european	2023	
Slovenia	SL	central-european	2023	
Austria	AT	central-european	2022	
Germany_East	DE-CE	central-european	2022	German data were divided according to the political division used in PECBMS, which corresponds with the proposal on Western and Central-Eastern flyways.*
Greece	GR	central-european	2022	
Lithuania	LT	central-european	2022	
Belgium-Wallonia	BE-WAL	western	2023	
France	FR	western	2023	
Italy_W	IT-W	western	2023	Italian data were specifically calculated for 2 parts according to the proposal. **
Portugal	PT	western	2023	
Spain	ES	western	2023	
Switzerland	CH	western	2023	
United Kingdom	GB	western	2023	
Belgium-Flanders	BE-FLA	western	2022	
Germany_W	GE-W	western	2022	German data were divided according to the political division used in PECBMS, which corresponds with the proposal on Western and Central-Eastern flyways.*
Netherlands	NL	western	2022	

* Germany delivers data to PECBMS with a 2-year delay. The calculation till 2022 is done only for the Turtle dove project.

** Italian team calculated national indices for both parts of the country on their own in the RTRIM-shell.

*** Cyprus delivers data to PECBMS with monitoring period starting in 2006. Biogeographically, this country probably belongs to the Black Sea-Middle East flyway, but it would be the only country in our dataset representing that flyway. Therefore, the Task Force on the Recovery of Birds, acting as the AHM governing body, opted to treat Cyprus as belonging to the Central-Eastern flyway management unit.

1.2.2. Flyway index calculation in RSWAN

The index for Central-Eastern flyway was calculated for the entire period 1982-2023, setting 1982 as the base year. For the Western flyway, the index was calculated for the entire period 1966-2023 (base year 1980). We use a tool called RSWAN, which is used as a standard tool for European index calculation in PECMBS.

1.2.3 Imputing of missing data during index calculation process

Each flyway index is calculated on the basis of a hierarchy of countries (for details see "PECBMS_computation_steps_2024.docx"). That hierarchy groups countries into regions with similar natural conditions, agriculture and history. This process allows calculating any missing values by using similar data and so to calculate indices in the most realistic way.

Imputing is used for all the missing years in the dataset. Therefore, a country which did not deliver data for last year is included in the supranational index calculations anyway. All the PECBMS countries which deliver high quality Turtle dove data are used for index and indicator calculations every year.

1.2.4 Country population sizes

The tool RSWAN, uses country population sizes for weighting of national data delivered by the countries/regions during the flyway index calculation.

Country population sizes from the European Red List of Birds (2021):

AT, BG, CH, CY, CZ, EE, ES, FR, GB, GR, HR, HU, LT, LV, NL, PL, PT, RO, SK, SL

Regional population sizes delivered by national coordinators:

BE-FLA, BE-WAL, DE-CE, DE-W

Italian population sizes calculated specifically for this project:

IT-CE, IT-W

Italian population sizes were delivered by the Italian coordinator. No available estimates at the regional level for flyways were available for Italy. Therefore, the Italian coordinator split the national estimates (150,000-300,000 BirdLife International 2017) in two according to a model assessing habitat suitability for the species: according to this model, 7.5% of the suitable habitat is located within the Western flyway and the remaining 92.5% within the Central-Eastern flyway.

Geometric mean for Italy divided into 2 parts was calculated this way:

$212132,0343559640 = \sqrt{\text{minimum_estimate} * \text{maximum_estimate}}$

=> Geometrical mean for Central-Eastern part = $212132,0343559640 * 92.5\% = 196222,1317792670$

Geometrical mean for Western part = $212132,0343559640 * 7.5\% = 15909,9025766973$

1.3 Acknowledgements

The PECBMS data were provided by the following national coordinators: **Austria:** Benjamin Seaman, Norbert Teufelbauer (Monitoring der Brutvögel Österreichs), **Belgium:** Antoine Derouaux, Jean-Yves Paquet, Glenn Vermeersch (Common Breeding Birds Flanders & Common Breeding Birds Survey in Wallonia - Le suivi des oiseaux communs en Wallonie (SOCWAL)), **Bulgaria:** Iordan Hristov, Georgi Popgeorgiev (Мониторинг на обикновените видове птици - Common Bird Monitoring Scheme), **Croatia:** Ivan Budinski, Dubravko Dender, Vlatka Dumbović Mazal, Iva Mihalić, Mate Zec (Monitoring čestih vrsta ptica poljoprivrednih staništa u Hrvatskoj - Common Farmland Bird Monitoring in Croatia), **Cyprus:** Christina Ieronymidou, Stalo Leontiou (Πρόγραμμα Παρακολούθησης Κοινών Πουλιών – Common Birds Monitoring Scheme), **Czechia:** Jiří Reif, Zdeněk Vermouzek, Petr Voříšek (Jednotný program sčítání ptáků (JPSP) - Breeding Bird Census Programme), **Estonia:** Meelis Leivits (KAUR), Renno Nellis (EOÜ - point count project), **France:** Benoît Fontaine, Frédéric Jiguet, Romain Lorrillièrre, Lorraine Delthel (Suivi Temporel des Oiseaux Communs (STOC) - French Breeding Bird Survey (FBBS)), **Germany:** Malte Busch, Martin Flade, Bettina Gerlach, Johannes Schwarz, Sven Trautmann (German Common Breeding Bird Survey & German Common Bird Census), **Greece:** Aris Manolopoulos, Danae Portolou (Πρόγραμμα Παρακολούθησης των Κοινών Ειδών Πουλιών της Ελλάδας – Hellenic Common Bird Monitoring Scheme (HCBM)), **Hungary:** Zoltán Görög, Károly Nagy, Tibor Szép (Mindennapi Madaraink Monitoringja (MMM) - Monitoring of our common birds), **Italy:** Mattia Brambilla, Gianpiero Calvi, Simonetta Cutini, Laura Silva (MITO2000 - Monitoraggio Italiano Ornitologico), **Latvia:** Ainārs Auniņš, Oskars Keiņš, Ieva Mārdega, Dagnis Vasilevskis (Latvijas ligzdojošo putnu uzskaites - Latvian Breeding Bird Monitoring scheme), **Lithuania:** Petras Kurlavičius, Renata Mackevičienė (Įprastų paukščių populiacijų gausos stebėseną (IPGS) – Lithuanian Common Bird Monitoring scheme), **Netherlands:** Arjan Boele, Joost van Bruggen, Adriaan Gmelig Meyling, Dorine Jansen, Chris van Turnhout, Jan-Willem Vergeer (BMP A – All breeding bird species project), **Poland:** Tomasz Chodkiewicz, Przemysław Chylarecki, Łukasz Wardecki (Monitoring Pospolitych Ptaków Lęgowych (MPPL) - Common Birds Survey), **Portugal:** Hany Alonso, Rúben Coelho, Cátia Gouveia, Guillaume Réthoré (Censo de Aves Comuns - Common Bird Census), **Romania:** Zoltán Benkő, Cristi Domșa, Ede Gábos, Zoltán D. Szabó, Judit Veres-Szászka (Monitorizarea Păsărilor Comune (MPC) - Common Bird Monitoring (CBM)), **Slovakia:** Jozef Ridzoň, Ján Topercer (Monitoring of breeding bird populations in Slovakia), **Slovenia:** Matej Gamser, Primož Kmecl (Slovenski monitoring pogostih ptic kmetijske krajine - Slovene monitoring of common farmland birds), **Spain:** Virginia Escandell, Emilio Escudero, Juan Carlos del Moral (Common Breeding Bird Monitoring Scheme (SACRE)), **Switzerland:** Christian Rogenmoser, Hans Schmid, Martin Spiess, Nicolas Strebel, Samuel Wechsler (Monitoring Häufige Brutvögel - Monitoring of common breeding birds), United Kingdom: James Heywood, Dario Massimino, David Noble (Breeding Bird Survey & Common Birds Census).