A species of hoverfly (*Cheilosia chloris*) | ©Frank Vassen

Policy Brief

Rolling out the EU Pollinator Monitoring Scheme:

European pollinator database, research, and training from Safeguard and other EU projects

Facundo Odriozola (IUCN), Evelyn Underwood (Institute for European Environmental Policy) & Maria Puchalska (IUCN)

SAFEGUARD
Safeguarding European wild pollinators

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In brief: Key policy messages and project results

Implement the EU Pollinator Monitoring Scheme (EU-PoMS) rigorously across member states, using Safeguard's tools and frameworks

- European pollinator database: centralised records of 2083 species of bees, 886 species of hoverflies and 496 species of butterflies with national species checklists and information on distribution
- Safeguard Knowledge Exchange Hub: research summaries, analysis and guidance
- Updated European Red Lists of bees, hoverflies, and butterflies and new national red lists

Establish and fund a centralised European pollinator database in which member states upload monitoring data to enable real-time data sharing, ensure open access, and avoid fragmentation

- This will allow transparent reporting by member states on progress towards the EU Nature Restoration Regulation's requirement to halt pollinator decline by 2030.

Establish EU-wide and cross-border coordination to focus on diversity hotspots and threatened species

- Mediterranean countries host the highest diversity of bee species, while hoverfly richness peaks in Alpine regions, reflecting distinct ecological drivers and conservation priorities.
- Many bee and hoverfly species occur in only one or two countries in Europe, with bee species hotspots in Greece, Spain, and the Mediterranean islands, whilst France has the most hoverfly species.

Invest in training national taxonomic experts and building capacity

- Supported by the resources and tools produced by Safeguard, EPIC, ORBIT, TAXO FLY and other linked initiatives

Integrate trait-based and diversity analyses into pollinator monitoring and conservation planning

- Safeguard European pollinator database provides spatial distribution and trait information – such as nesting requirements.

Pollinators decline and the EU Pollinators Initiative

Pollinators play a crucial role in maintaining ecosystem resilience and food production. Without pollinators, many wild plants could not reproduce, and numerous crops would fail, leading to a massive decline in both food production and biological diversity. The continued provision of these essential ecosystem services is threatened by the decline of pollinator populations. The most recent European Red List Assessment highlights a worsening situation since the mid-2010s. An estimated 10% of wild bee species (EC, Michez et al, 2026), 15% of butterfly species (EC, van Swaay et al, 2025), and 37.2% of hoverfly species (EC, Vujic et al, 2023) in Europe are threatened with extinction.

Key drivers of this decline include land-use change, intensive agricultural management, pesticide use, pollution, invasive alien species, pathogens, and climate change (IPBES, 2016). Reversing this trend is essential to safeguard the foundations of resilient food systems and healthy ecosystems for future generations.

In response to the scale of the pollinator decline, the **EU Pollinators Initiative** sets the goal of reversing pollinator decline in wild pollinators by 2030, under the umbrella of the EU Biodiversity Strategy for 2030. A major turning point was the adoption of the EU **Nature Restoration Regulation** in 2024, which enshrines this ambition into law. Article 10 obliges member states to improve pollinator diversity and reverse pollinators decline by 2030, and to achieve an increasing trend in pollinator diversity thereafter until populations reach satisfactory levels. It also commits the European Commission to establishing, together with member states, an **EU Pollinator Monitoring Scheme (EU PoMS)**. The Delegated Regulation (published November 2025) establishes a science-based method for monitoring pollinator diversity and pollinator populations.

The EU-PoMS aims to provide long-term, regular and comparable data to underpin evidence-based pollinators conservation and restoration. The standard method applied across Europe will ensure a robust and harmonised data collection at species level, enabling effective pollinator conservation and supporting Member States in fulfilling their legal obligations.

A species of syrphid fly (*Chalcosyrphus curvipes*) | ©Frank Vassen

A species of drone fly (*Mallota fuciformis*) | ©Frank Vassen

The Safeguard project

Safeguard, an EU-funded Horizon 2020 project (2021–2026), has improved understanding of the drivers of pollinator decline and their environmental, economic, and societal impacts, while delivering an integrated assessment framework for effective policy and management responses. The project has made an essential contribution to the knowledge base that supports long-term pollinator monitoring.

Other EU initiatives working in synergy with Safeguard

The Taxo-Fly and ORBIT projects (2021–2025) have created a comprehensive taxonomic and ecological database for European hoverfly and bee species respectively, serving as a coherent and open resource for research, education, monitoring and public engagement.

The European Pollinator Identification Courses (2025–2027) are expanding para-taxonomic expertise across the 27 EU Member States for wild bees, hoverflies and butterflies. Each project is focused in one group – EPIC-Bee, EPIC-Fly, and EPIC-Butterfly – and delivers training to build a network of para-taxonomic experts capable of accurate species identification in both field and laboratory settings, supporting EU-PoMS implementation. The Pollinator Academy is a learning platform with integrated taxonomic tools and information on European pollinators that provides access to resources and training materials to make taxonomic knowledge accessible.

Key results of Safeguard project research

First centralised European pollinator database supports EU pollinator monitoring

Safeguard has compiled an updated catalogue of more than 3000 bee and hoverfly species across Europe, showing their current distributional status at the national level (in the form of present, absent, regionally extinct, possibly extinct or non-native) (Sentil et al, 2025).

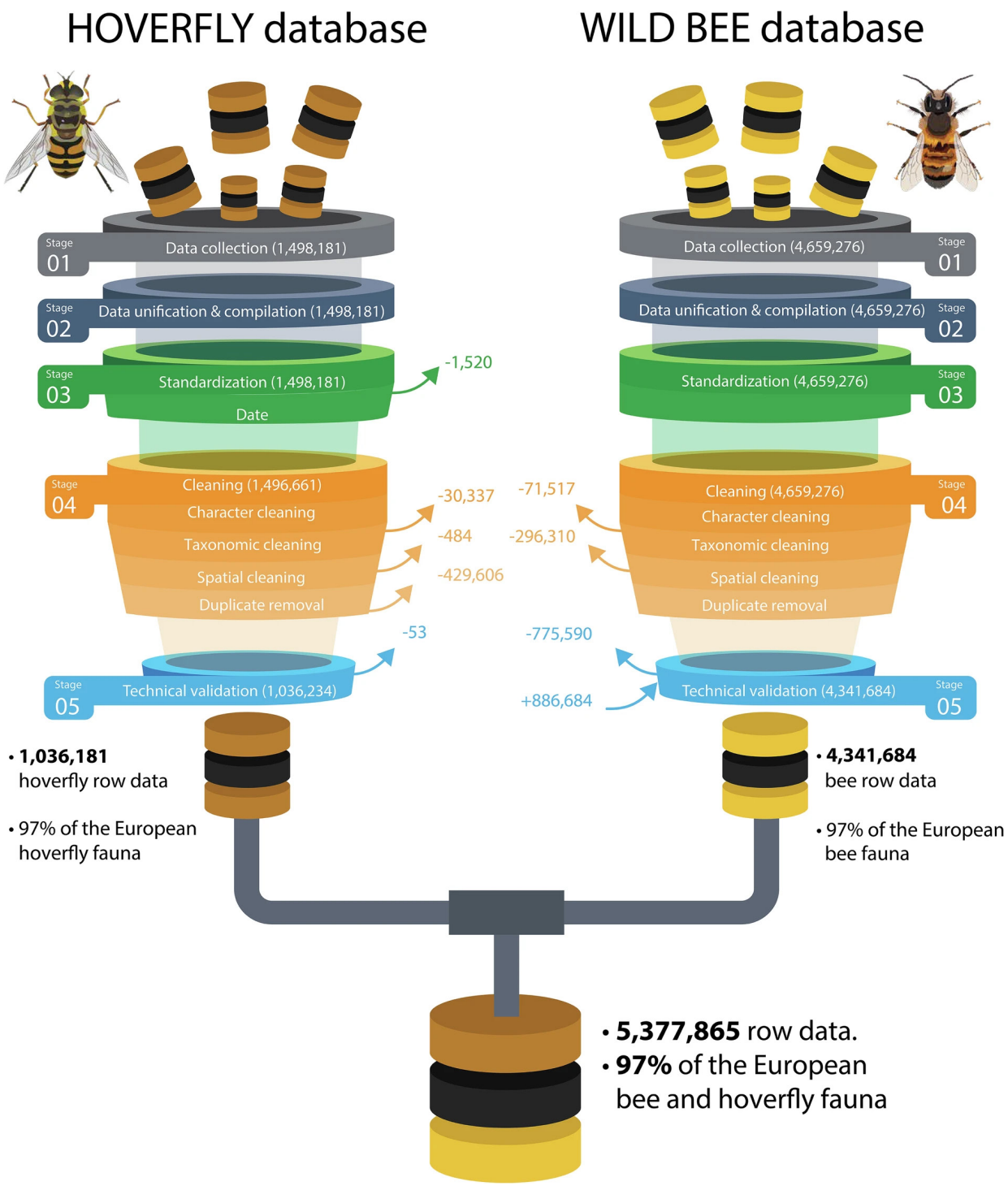
Safeguard has compiled datasets from diverse sources, including taxonomists, national experts, public repositories, museum collections, published literature, verified open-access platforms, and aggregated datasets from previous European projects. The collected data were standardised, cleaned and validated by taxonomists and national experts. This collective effort resulted in two databases comprising more than 4.34 million and 1.04 million records for wild bees and hoverflies, respectively. The databases cover 97% of the European bee fauna (2083 species out of 2138 recorded in Europe) and 97% of the European hoverfly fauna (886 species out of 913 recorded in Europe). These standardised databases constitute essential resources for future assessments of status and trends, habitat associations, and other research and conservation initiatives to protect and understand wild pollinators on the European continent.

Safeguard provides the first bee species checklists for Albania, Bosnia and Herzegovina, Croatia, Greece (separating Crete and the East Aegean Islands), Moldova, Montenegro, North Macedonia, Ukraine (separating Crimea) and Turkey (the European part) (Reverté et al, 2023).

Safeguard provides the first hoverfly species lists for Albania, Bosnia and Herzegovina, Croatia, Cyprus, Moldova and Turkey (the European part) (Reverté et al, 2023).

These pollinator species databases are essential for planning the EU-PoMS, as the data can be used to define the scope of common species monitoring and rare species monitoring at the national level. The databases are accessible to the national pollinator monitoring coordinators and their surveyors.

Figure 1. Summary of the data processing workflow of bees and hoverflies: data collection, data unification and compilation, standardisation, cleaning (character cleaning, taxonomic cleaning, spatial cleaning, and duplicate removal), and technical validation. The numbers in brackets indicate the number of raw data at each processing stage. The numbers outside the funnels indicate the number of raw data removed (preceded by "-") or added (preceded by "+"). **Copyright:** Image provided by Ahlam Sentil



Pollinator diversity and distribution patterns help to set conservation priorities

Safeguard research illustrates that pollinator diversity and distribution patterns vary greatly across Europe, and that diversity hotspots differ across the pollinator groups. Greece leads in bee diversity (1187 species), while France leads in hoverfly diversity (566 species) (Reverté et al, 2023). Mediterranean countries host the highest diversity of bee species, while hoverfly richness peaks in Alpine regions, reflecting distinct ecological drivers and conservation priorities. The research highlights the diversity hotspots of the different pollinator groups, and the location of endemic species and species with narrow distributions on the continent.

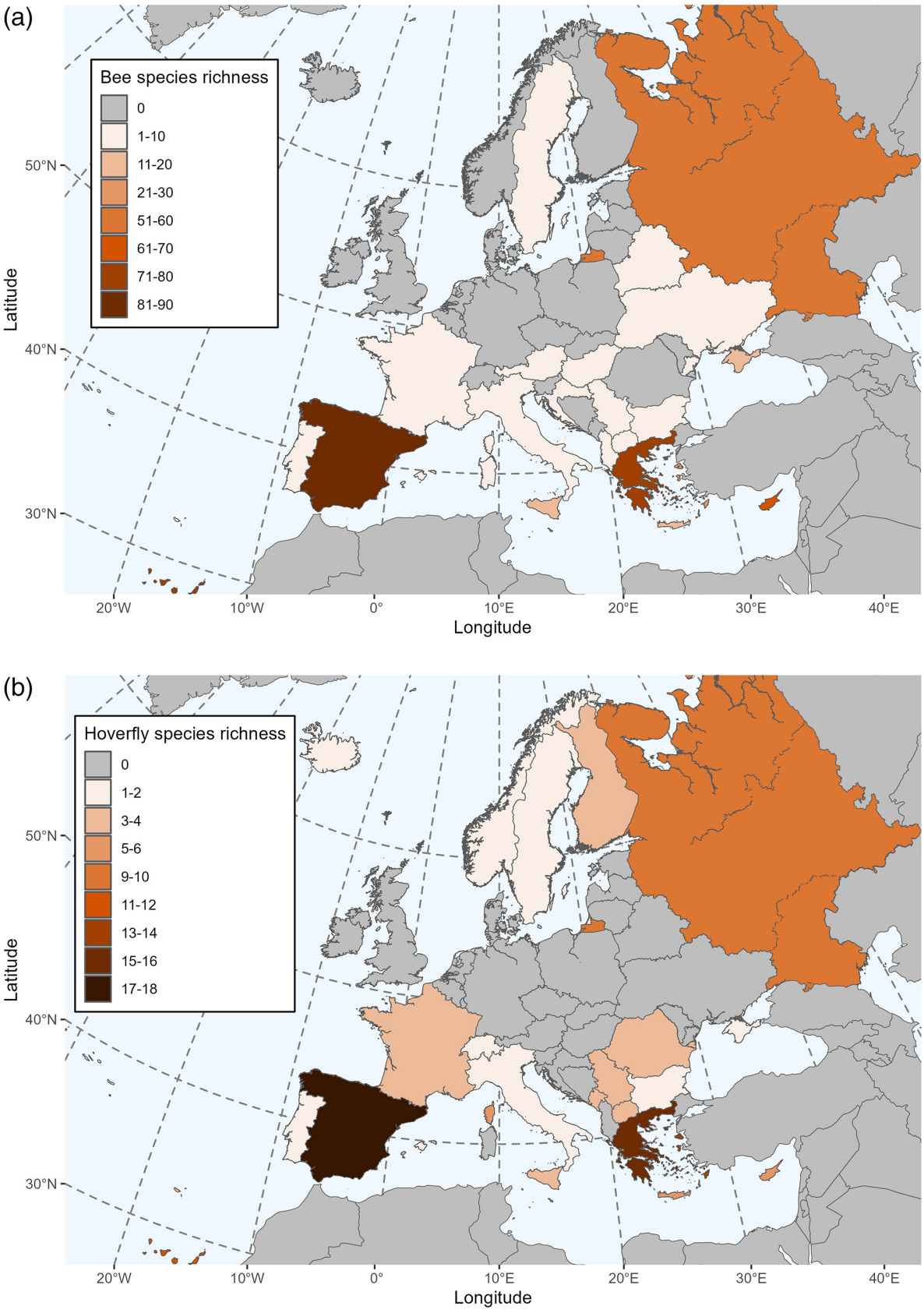
This data was behind the updated European Red List of Bee species, that decreased the number of data deficient species (species where there was not enough information to assess their conservation status) from 57% in the first Red List in 2014 to 14% in the new list (European Commission, Michez et al, 2025). The new assessment reveals that in Europe, 171 bee species (10.4% of the total) are threatened with extinction (Critically Endangered, Endangered, or Vulnerable). Depending on treatment of Data Deficient species, the proportion ranges from 8.9% to 23.3%.

The data are the starting point for the generation of new national Red Lists, particularly in relation to wild bees, mainly through the compilation of national occurrence data, checklists, and expert networks. New national red lists have been published in Belgium, Switzerland, and the Netherlands. The data are now being used to produce national red lists in France, Italy, Cyprus, Spain, Portugal and Hungary. Other countries have started the preparatory stage of red listing.

This information is useful for member states to set conservation priorities under the EU Nature Restoration Regulation.

Chocolate mining bee (*Andrena scotica*)

Figure 2. Map of Europe, representing the richness of bee (a) and hoverfly (b) species recorded in each country (or sub-country unit) or its European part. Countries in grey colour were not included in this study. **Copyright:** Image provided by Sara Reverté



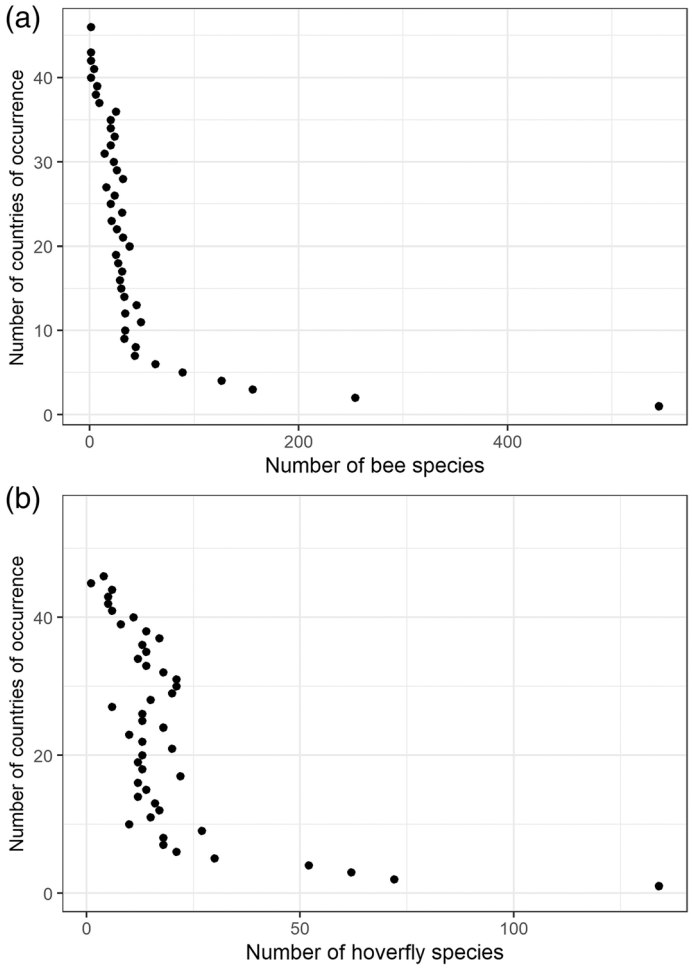
Many pollinator species are restricted to one or two European countries only

Safeguard research reveals that of the approximately 3000 European bee and hoverfly species in Europe, 807 bee species and 199 hoverfly species occur in only one or two countries (Reverté et al 2023).

In Europe, Greece has the highest number of bee and hoverfly species not found anywhere else in Europe, with 77 occurring only in mainland Greece, 26 in the East Aegean Islands and 19 only in Crete. Spain follows with 171 endemic bee and hoverfly species, and Cyprus has 65 species not found anywhere else in Europe.

These findings are important to detect diversity hotspots and coordinate European and national conservation strategies and pollinator monitoring. In the EU-PoMS rare species module (article 7 of the delegated regulation), member states have the option to carry out targeted monitoring of pollinator species assessed as critically endangered, based on the EU Red List and/or their national red lists.

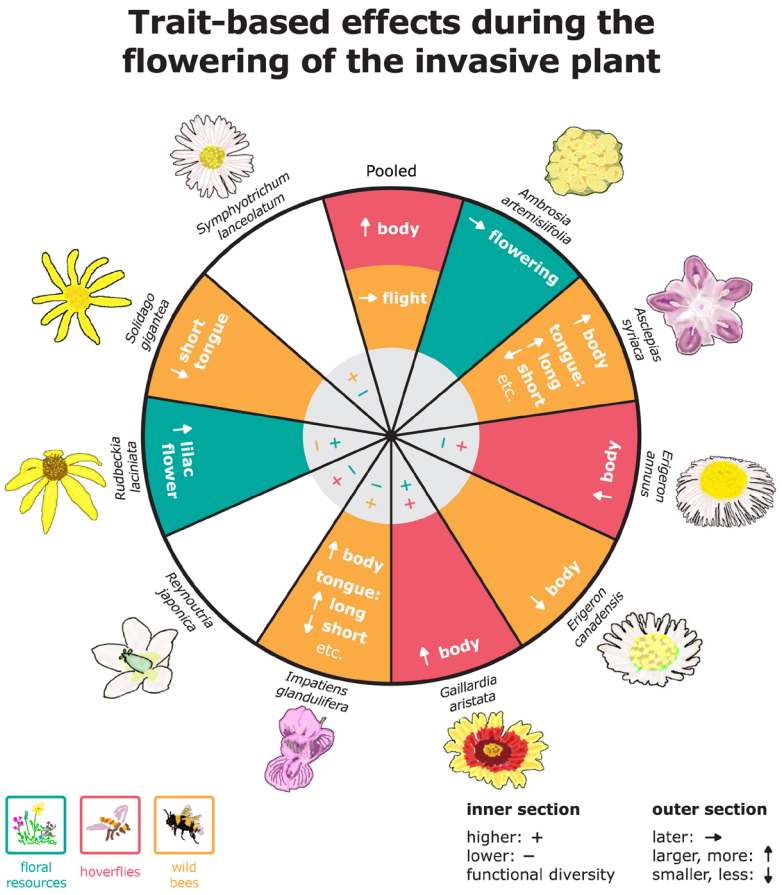
Figure 3. Repartition of species of bees (a) and hoverflies (b) within European countries. The X-axis represents the number of species, and the Y-axis represents the number of countries. Only a few species occur in many countries, and many species occur in a small number of countries. **Copyright:** Image provided by Sara Reverté



Trait-based effects of plant invasion on floral resources, hoverflies and bees

Safeguard research shows that invasive plant species can strongly reshape pollinator communities by altering both the **timing and quality of floral resources** (Szigeti et al, 2023). The observational study sampled hoverfly and bee communities in invaded and non-invaded (control) sites before and during the flowering of 10 invasive herbaceous species. Invaded habitats were found to function similarly to mass-flowering crops such as rapeseed or sunflower fields: they provide a short pulse of abundant nectar and pollen during flowering, followed by long periods of severe resource scarcity. For most of the year, invasive plants dominate sites through dense vegetative growth but offer little or no food resources, in contrast to semi-natural habitats that provide more diverse and continuous floral resources. This temporal mismatch reduces habitat suitability for many pollinators and increases dependence on a narrow flowering window.

The trait-based analysis shows that **not all pollinators benefit equally** from invasive plants. The effects depend on the compatibility between plant traits (such as flower depth and structure) and pollinator traits (such as body size and tongue length). Invasive species with deep or restricted flowers tend to favour larger, long-tongued bees, while species with shallow flowers mainly attract smaller-bodied bees. Hoverfly communities also shift, with larger species becoming more common in invaded sites during flowering. These changes lead to a homogenisation of pollinator communities and can reduce functional diversity outside short flowering periods, with implications for ecosystem resilience and long-term pollination services.



Policy recommendations

Implement the EU-PoMS rigorously across member states, using Safeguard's tools and frameworks

Establish and fund a centralised European pollinator database in which member states upload monitoring data to enable real-time data sharing, ensure open access, and avoid fragmentation. Member states should provide incentives to private stakeholders to contribute to monitoring. National pollinator databases and data-sharing mechanisms should be strengthened and interoperable, enabling regular exchange of monitoring data at EU level and the assessment of restoration success. This will allow transparent reporting by member states on progress towards the EU Nature Restoration Regulation's requirement to halt pollinator decline by 2030.

Establish EU wide and cross-border coordination to focus on diversity hotspots and threatened species

Establish continuous exchange of pollinator monitoring data and coordinated conservation planning between European countries that share the same pollinator species and habitats. This can strengthen the protection of threatened pollinator species with transboundary distributions. Considering Safeguard's findings that many bee and hoverfly species occur in only one or two countries, cross-border coordination on pollinators conservation will ensure that species with limited or transboundary ranges are effectively monitored and conserved across national borders.

White-cheeked banded digger bee (*Amegilla albigena*)

Invest in training national taxonomic experts and building capacity

Investment should be prioritised in training national taxonomic experts and building capacity in pollinator identification, supported by the resources and tools produced by Safeguard, EPIC, ORBIT, TAXO FLY and other linked initiatives. Increasing the awareness of the public will generate new volunteers and citizen science data. This will strengthen species monitoring and implementation of targeted pollinator conservation strategies.

For bees, the south-eastern part of Europe, especially the Balkans, is where most of the taxonomic work and capacity are needed, because historically it has been understudied. Eastern Europe also has the highest research gap for hoverflies, especially some countries in the south-east, such as Albania.

Integrate trait-based and diversity analyses into pollinator monitoring and conservation planning

Building on Safeguard's European pollinator distribution database, Member States should integrate trait-based and functional diversity analyses into pollinator monitoring and conservation planning, to better assess habitat quality, restoration outcomes, and pollinator community sensitivity to environmental change. The Safeguard database provides a large-scale reference for understanding how ecological traits influence the spatial distribution of bee and hoverfly species across Europe. Species traits such as nesting habitat requirements are essential for the identification and monitoring of pollinator species as indicators of habitat quality. Conservation planning for protected area networks should consider species traits and community sensitivity to environmental change.

A species of holarctic hoverfly (*Chrysotoxum fasciolatum*) | ©Frank Vassen

Safeguard publications referenced in this brief

Reverté, S, Miličić, M, Ačanski, J, Andrić, A, Aracil, A, Aubert, M, Balzan, M V, Bartomeus, I, Bogusch, P, Bosch, J, Budrys, E, Cantú-Salazar, L, Castro, S, Cornalba, M, Demeter, I, Devalez, J, Dorchin, A, Dufrêne, E, Đorđević, A, Fisler, L, Fitzpatrick, Ú, Flaminio, S, Földesi, R, Gaspar, H, Genoud, D, Geslin, B, Ghisbain, G, Gilbert, F, Gogala, A, Grković, A, Heimburg, H, Herrera-Mesías, F, Jacobs, M, Janković Milosavljević, M, Janssen, K, Jensen, J-K, Ješovnik, A, Józan, Z, Karlis, G, Kasparek, M, Kovács-Hostyánszki, A, Kuhlmann, M, Le Divelec, R, Leclercq, N, Likov, L, Litman, J, Ljubomirov, T, Madsen, H B, Marshall, L, Mazánek, L, Milić, D, Mignot, M, Mudri-Stojnić, S, Müller, A, Nedeljković, Z, Nikolić, P, Ødegaard, F, Patiny, S, Paukkunen, J, Pennards, G, Pérez-Bañón, C, Perrard, A, Petanidou, T, Pettersson, L B, Popov, G, Popov, S, Praz, C, Prokhorov, A, Quaranta, M, Radchenko, V G, Radenković, S, Rasmont, P, Rasmussen, C, Reemer, M, Ricarte, A, Risch, S, Roberts, S P M, Rojo, S, Ropars, L, Rosa, P, Ruiz, C, Sentil, A, Shparyk, V, Smit, J, Sommaggio, D, Soon, V, Ssymank, A, Ståhls, G, Stavrinides, M, Straka, J, Tarlap, P, Terzo, M, Tomozii, B, Tot, T, van der Ent, L-J, van Steenis, J, van Steenis, W, Varnava, A I, Vereecken, N J, Veselić, S, Vesnić, A, Weigand, A, Wisniowski, B, Wood, T J, Zimmermann, D, Michez, D and Vujić, A (2023) **National records of 3000 European bee and hoverfly species: A contribution to pollinator conservation.** ***Insect Conservation and Diversity***. No 16 (6), 758–775.

Sentil, A, Miličić, M, Benrezkallah, J, Ačanski, J, Andrić, A, Aubert, M, Bartomeus, I, Biella, P, Boustani, M, Carstensen, L B, Bogusch, P, Bot, S, Brau, T, Budrys, E, Salazar, L C, Cappellari, A, Carion, F, Castro, S, Cavaillès, S, Cerretti, P, Dathe, H H, De Groot, M, De Tandt, B, Devalez, J, Devorsine, R, Díaz-Calafat, J, Đorđević, A, Dormal, A, Dufrêne, E, Dussaix, C, Fedorova Zaytseva, L A, Fiordaliso, W, Flaminio, S, Földesi, R, Forgeois, V, Gadoum, S, Garrin, M, Gaspar, H, Gazzea, E, Geppert, C, Gérard, M, Geslin, B, Ghisbain, G, Gibernau, M, Grković, A, Heimburg, H, Herinckx, A, Demeter, I, Janković Milosavljević, M, Janssen, K, Kasparek, M, Kierat, J, Kleijn, D, Kuhlmann, M, Lair, X, Lemaire, S, Lenzi, L, Likov, L, Litman, J, Lopes, S B, Loureiro, J, Maarten, J, Maestracci, P-Y, Marini, L, Maritano, U, Mei, M, Mignot, M, Stojnić, S M, Nedeljković, Z, Ockermueller, E, Ortiz-Sanchez, F J, Patiny, S, Paukkunen, J, Pennards, G, Perrard, A, Petanidou, T, Popov, G, Popov, S, Potts, S G, Prokhorov, A, Pruner, S, Rad chenko, V, Radenković, S, Rasmont, P, Reverté, S, Ricarte, A, Rojo, S, Romig, T, Rosa, P, Ruiz, C, Sagot, P, Santerre, R, Scheper, J, Selis, M, Sgolastra, F, Shparyk, V, Siopa, C, Skendžic, T, Smit, J, Sommaggio, D, Soon, V, Ssymank, A, Ståhls, G, Stavrinides, M, Steffan-Dewenter, I, Straka, J, Thulier, J, Tot, T, Tourbez, C, van Steenis, J, van Steenis, W, Varnava, A, Veselić, S, Vesnic, A, Vray, S, Williams, P, Wood, T J, Zimmermann, D, Żmuda, A, Vujić, A, Michez, D and de Manincor, N (2026) **Synthesised database of wild bee and hoverfly records in Europe.** *Scientific Data*.

Szigeti, V., Fenesi, A., Botta-Dukát, Z., Kuhlmann, M., Potts, S. G., Roberts, S., Soltész, Z., Török, E., Kovács-Hostyánszki, A. (2023) **Trait-based effects of plant invasion on floral resources, hoverflies and bees.** *Insect Conservation and Diversity* 16(4): 483–496

Other references and further resources

To follow the most recent EU pollinator updates, see the **EU Pollinator Information Hive**

Safe-Hub (Safeguard Knowledge Exchange Hub): The latest pollinator research and resources

Taxo-Fly project: An EU-funded service contract to generate taxonomic information for all European hoverflies

ORBIT project: Developing resources for European bee inventory and taxonomy

European Pollinator Identification Courses: Enhancing knowledge of pollinator identification and sampling across Europe

Pollinator Academy: European, open source platform for sharing taxonomic knowledge

EU Pollinator Monitoring scheme: **Commission Delegated Regulation (EU) 2025/2188** of 19 September 2025 supplementing Regulation (EU) 2024/1991 of the European Parliament and of the Council by establishing a science-based method for monitoring pollinator diversity and pollinator populations

European Commission (2023). **Revision of the EU Pollinators Initiative: A new deal for pollinators.** Communication from the commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM/2023/35 final

European Commission Directorate-General for Environment, Vujic, A and et al (2023) ***Pollinators on the edge. Our European hoverflies: the European red list of hoverflies.*** Publications Office of the European Union

European Commission: Directorate-General for Environment, van Swaay, C, Warren, M, Ellis, S, Clay, J and et al (2025) ***Measuring the pulse of European biodiversity: European Red List of Butterflies. Version 1.1.*** European Commission

European Commission: Directorate-General for Environment, Michez, D., Boustani, M., Sentil, A., Benrezkallah, J., de Manincor, N., Wood, T. J., Álvarez Fidalgo, P., Aubert, M., Bellotto, V., Biella, P., Bogusch, P., Bosch, J., Brau, T., Browne, K., Carion, F., Castro, L., Cederberg, B., Clay, J., Debont, T., Bila Dubaić, J., Dall'Olio, R., Dellicour, S., Devalez, J., Devorsine, R., Dufrêne, E., De la Rúa, P., De Tandt, B., Evrard, D., Flaminio, S., Fiordaliso, W., Fontana, P., Gadoum, S., Galbany Casals, M., Gaspar, H., Gekière, A., Gérard, M., Geslin, B., Kasparek, M., Kierat, J., Kohl, P. L., Kuhlmann, M., Kryger, P., Leclercq, N., Le Divelec, R., Lemaire, S., Lescot, S., Lhomme, P., Litman, J., Marshall, L., McCormack, G. P., Moro, A., Mudri Stojnić, S., Ockermueller, E., Oleksa,

A., Ortiz-Sánchez, F. J., Patiny, S., Paukkunen, J., Perrard, A., Petanidou, T., Pinto, M. A., Potts, S. G., Praz, C., Put, S. C. L., Radchenko, V. G., Rasmont, P., Requier, F., Reverté, S., Risch, S., Rogenstein, S., Rosa, P., Ruiz, C., Rutschmann, B., Santerre, R., Smit, J., Straka, J., Thulier, J., Tourbez, C., Trottet, A., Vereecken, N. J., Williams, P. H., Winter, E., Zimmermann, D., & Ghisbain, G. (2025). **Measuring the pulse of European biodiversity using the Red List. European Red List of Bees. Brussels, Belgium: European Commission.** xii+162 pp.

IPBES (2016) ***The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production.*** S.G. Potts, V. L. Imperatriz-Fonseca, and H. T. Ngo (eds.). Annex to document IPBES/4/INF/1/Rev.1, Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany

Wiemers M, Balletto E, Dincă V, Fric ZF, Lamas G, Lukhtanov V, Munguira ML, van Swaay CAM, Vila R, Vliegenthart A, Wahlberg N, Verovnik R (2018) **An updated checklist of the European Butterflies (Lepidoptera, Papilionoidea)**. *ZooKeys* 81: 9–45

This brief was produced by Facundo Odriozola (IUCN), Evelyn Underwood (Institute for European Environmental Policy) & Maria Puchalska (IUCN) with inputs from Safeguard researchers (with special thanks to Sara Reverté & Denis Michez).

Logjammer hoverfly (*Chalcosyrphus eunotus*) | ©Frank Vassen

Pine hoverfly (*Blera fallax*)| ©Frank Vassen

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