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Report of the 3rd Annual General Meeting of *ENETWILD* Brussels - 24-25th May 2023

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Abstract

The *ENETWILD* consortium has been implementing a project funded by EFSA since 2017, aiming to collect information on wildlife distribution and abundance in Europe for risk assessment. The 3rd Annual General Meeting (AGM) held in Brussels in May 2023 brought together experts and stakeholders specializing in wildlife health, ecology, and management to share developments and best practices in wildlife monitoring and management. The AGM focused on establishing a harmonized framework for international decision-making and addressing the lack of comprehensive wildlife monitoring plans in Europe. During the Working Group Sessions, participants were divided into four groups to address specific objectives related to harmonized wildlife monitoring. The approach aimed to ensure representation of different expertise and background of the stakeholders and foster collaboration among them. The outcomes of these sessions highlighted key gaps and challenges, including lack of standardization, data fragmentation, and limited long-term monitoring. It was recommended promoting successful initiatives, engaging multiple stakeholders, establishing a European Working Group on integrated wildlife management that incorporate emerging technologies to address those gaps. By following these recommendations, the development of a comprehensive framework for harmonized wildlife monitoring in Europe can be advanced, contributing to conservation efforts, preserving biodiversity, and ensuring the long-term sustainability of wildlife populations.

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Key words: wildlife data collection, wildlife management legislation, wildlife monitoring, international coordination, science-based decision-making, human dimension

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¹ www.enetwild.com

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Summary

The *ENETWILD* consortium (www.enetwild.com) has implemented an EFSA-funded project since 2017, whose main objective is to collect information regarding the geographical distribution and abundance of wildlife throughout Europe to subsequently create geospatial tools to be used in further risk assessment. The 3rd Annual General Meeting (AGM) of the *ENETWILD* project took place on May 24th-25th, 2023, in Brussels, Belgium. The event brought together 52 experts specializing in wildlife health, population ecology, and management. Attendees represented a diverse range of stakeholders, including organizations, administrative bodies, academic institutions, data providers, and project partners. The main objective of the 3rd AGM was to update on the latest developments of *ENETWILD* project and to share research findings and best practices in wildlife monitoring and management. The meeting consisted of interactive sessions, workshops, and presentations that facilitated discussions on key topics related to wildlife health and effective management strategies. Through collaborative decision-making, the AGM aimed to define priorities, action plans, and areas for further research and collaboration. The meeting also focused on networking and relationship-building, fostering connections between stakeholders, researchers, and project partners. This encouraged future collaborations and the exchange of ideas beyond the event itself.

The 3rd AGM addressed the lack of comprehensive wildlife monitoring and management plans in Europe and aimed to establish a harmonized framework for international decision-making. The specific objectives included presenting *ENETWILD*'s progress, learning from international contexts, and proposing guidance for harmonized wildlife monitoring at national and international levels in Europe.

The expected outcomes of the meeting included i) providing guidance for a comprehensive framework, ii) reaching agreements on shared objectives, iii) offering recommendations for implementing population monitoring, iv) strengthening the *ENETWILD* network, and v) identifying legislative needs and administrative roles.

Achieving these outcomes would contribute significantly to the development of robust wildlife monitoring and management plans, supporting conservation efforts, preserving biodiversity, and ensuring the long-term sustainability of wildlife populations in Europe. The workshop's practical guidance and recommendations would serve as valuable resources for designing and implementing effective monitoring programs (*ENETWILD* consortium has prepared a guidance on how to start up a national wildlife population monitoring program harmonizable at European level as a separate document). Additionally, the establishment of a comprehensive framework would enhance our understanding of population dynamics and species distribution, enabling proactive conservation planning and protection efforts.

During the Working Group Sessions of the workshop on European harmonized wildlife monitoring, participants were divided into four groups with specific objectives and tasks. The approach aimed to ensure diverse representation within each group to generate integrated conclusions reflecting the perspectives of all stakeholders. The inclusive nature of the groups encouraged active engagement, collaboration, and the exchange of diverse insights and experiences.

- Group 1 focused on assessing the existence of common objectives across different wildlife monitoring initiatives and exploring the potential for developing an adaptive framework.
- Group 2 addressed the design and methodology aspects necessary for achieving harmonized wildlife monitoring practices.
- Group 3 aimed to streamline and automate the flow of wildlife data collection at the European level,
- Group 4 focused on developing proposals for effective data management and documentation.

The primary objective of the working group sessions was to facilitate the exchange of experiences and foster a collaborative learning environment. By dividing participants into these working groups and outlining specific objectives and tasks, the workshop aimed to foster focused discussions and generate practical recommendations for advancing harmonized wildlife monitoring in Europe.

The detailed outcomes of each group's discussions provided valuable recommendations and potential pathways identified by each group. By incorporating the perspectives of different stakeholders, the results highlight a comprehensive and balanced approach to addressing challenges and seizing opportunities in European wildlife monitoring. The workshops' effectiveness was ensured by merging and integrating conclusions, proposals, and recommendations obtained by different breakout groups.

The conclusions highlighted key gaps and challenges in harmonized monitoring programs at European level:

- Lack of standardization: differences in methods and protocols across monitoring initiatives hinder data integration and comparison.
- Fragmentation of efforts: multiple initiatives across countries lead to data and effort fragmentation.
- Data sharing and access: limited data sharing and accessibility create barriers to harmonization.
- Inconsistent spatial and temporal coverage: uneven monitoring efforts result in data gaps across Europe.
- Lack of long-term monitoring: insufficient funding and resources hinder continuous long-term monitoring.
- Insufficient integration of emerging technologies: greater integration of modern technologies is needed.
- Limited coordination and governance: a centralized coordinating body is missing, hindering collaboration.
- Lack of harmonized objectives: varying objectives among initiatives challenge harmonization.
- Policy and legal barriers: national policies and legal frameworks can hinder harmonization efforts.

To address these gaps, the *ENETWILD* consortium recommends:

- Promoting and expanding successful initiatives like European Observatory of Wildlife (*EOW*²) and IT tools as *AGOUTI*³.
- Engaging multiple stakeholders, including administrations, academia, and other relevant organizations, for collaboration and data integration.
- Defining clear objectives, engaging stakeholders, and establishing a multidisciplinary European Working Group to develop guidance on integrated wildlife management.
- Evaluating existing monitoring initiatives, creating standardized data collection protocols, and implementing a data management framework.
- Integrating emerging technologies, encouraging collaboration, engaging with policymakers, and disseminating the guidance widely.
- By following these steps, substantial advancements can be made in developing guidance for harmonized wildlife monitoring in Europe in the short-to-medium term (five-year horizon). Proactive involvement from European administrations, experts, and stakeholders is essential for the successful implementation of the *ENETWILD* project and the long-term protection of European wildlife.

² <https://wildlifeobservatory.org/>

³ <https://agouti.eu/>

Table of contents

Abstract	1
Summary	3
1.1. Background and terms of reference as provided by the requestor	7
1.2. The Significance and Achievement of the AGM.....	7
2. The 3rd AGM of the ENETWILD project	9
2.1. Meeting Objectives and anticipated Outcomes.....	11
2.2. The introductory session as a foundation for the workshop.....	13
2.3. Discussion during workshops	17
2.3.1. Working group session objectives and tasks	17
2.3.2. Group 1: Objectives and Evaluation.....	19
2.3.3. Group 2: Design and Methodology for Harmonized Wildlife Monitoring	24
2.3.4. Group 3: Wildlife Data Collection Streamlining at the European Level	27
Group 4: Data Management and Documentation	29
3. Conclusions of the 3rd AGM of ENETWILD.....	31
4. Final remarks.....	34

1. Introduction


1.1. Background and terms of reference as provided by the requestor

This report is a deliverable of the specific contract 1 related to the framework contract "Wildlife: collecting and sharing data on wildlife populations, transmitting animal disease agents" (Contract number: OC/EFSA/ALPHA/2016/01) awarded by EFSA to Universidad de Castilla-La Mancha. The specific contract 11 required the organisation of a general meeting with relevant stakeholders and a related report of the outcomes of such meeting.

1.2. The significance and achievement of the AGM

The *ENETWILD* project (www.enetwild.com) is funded by the European Food Safety Authority (EFSA) with the aim of collecting standardized data at the European level to analyse and assess the risks of diseases shared between wildlife, livestock, and humans. The primary objective of the project is to enhance the surveillance and monitoring of emerging and epizootic diseases in wildlife populations across Europe, necessitating a harmonized approach. At the project's inception, there was a lack of unified systems for predicting and monitoring the status of wildlife populations in an integrated manner. Addressing this issue became a key focus of the *ENETWILD* project, which was consistently achieved through extensive activities conducted over subsequent years. In addition, regular meetings were established to facilitate the exchange of experiences, ensuring the quality of data collection and storage in uniform databases. These data play an essential role in conservation and wildlife management efforts. The *ENETWILD* project was publicly launched in January 2018, accompanied by well-organized discussion workshops that brought together 70 experts specializing in ecology, management, and wildlife epidemiology (*ENETWILD*-Consortium et al 2018). These workshops served as crucial platforms for addressing three fundamental questions that guided the project's initial phase:

1. Data Requirements for Wildlife Abundance Mapping: The workshops focused on determining the types of data needed to develop accurate wildlife abundance maps. Through collaborative discussions and knowledge sharing, experts identified the key variables, indicators, and methodologies necessary for robust abundance estimation.
2. Harmonization of Abundance Estimation across Regions: Another important aspect discussed during the workshops was the harmonization of abundance estimation methods across different regions and countries. Participants explored strategies and approaches to ensure consistency and comparability in abundance estimation techniques, allowing for meaningful cross-regional and cross-country comparisons.

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3. Improving the Collection of Distribution and Abundance Data: The workshops also delved into ways to enhance the collection of distribution and abundance data. Experts brainstormed innovative approaches, methodologies, and data collection protocols that could improve the efficiency, accuracy, and reliability of data collection efforts.

As a result of these workshops, a network of population data providers was established and supported. This network played a crucial role in collecting and sharing valuable data and metadata on wildlife distribution, abundance, and density. The collaboration among data providers enabled the creation of a comprehensive database that serves as the foundation for the European Observatory of Wildlife (EOW). To ensure the successful implementation of the project, comprehensive training programs were implemented. These programs covered various aspects, including study design, field protocols, methods, and data analysis. By equipping researchers and practitioners with the necessary skills and knowledge, these training initiatives ensured the generation of high-quality data and promoted standardized practices across the network. This observatory comprises a network of study sites capable of providing reliable and long-term data on wildlife abundance. The EOW serves as a valuable resource for researchers, policymakers, and stakeholders, offering a wealth of information for evidence-based decision-making and conservation actions.

The second meeting, held in October 2021, focused on enhancing European capacities for wildlife population monitoring and emphasized the importance of adopting common, harmonized, and reliable practices (ENETWILD-consortium et al 2021). The primary objective was to integrate these monitoring efforts into policy development, fostering a holistic and integrated approach to sustainable wildlife monitoring and management. The workshops conducted during the meeting played a pivotal role in identifying key elements that would guide the project's direction in the coming years.

During the discussions, several crucial points emerged that resonated with the participants and helped shape the future course of action. These points include:

1. Disproportionate Management: It was widely acknowledged that the management of wildlife resources often lacks scalability and proportionality in relation to their ecological and socio-economic significance. Addressing this imbalance was recognized as a key priority to ensure effective conservation and sustainable management practices.
2. Lack of Coordinated Institutional Decisions: The need for improved coordination and collaboration among institutions became evident. Participants emphasized the importance of both vertical coordination (from local to international levels) and horizontal coordination (among different interests or sectors at each level) to foster collective action and maximize conservation efforts.

3. Insufficient data and monitoring frameworks: A significant challenge identified was the lack of useful data for many taxa. Even where data exist, there is a lack of coordination among European-wide monitoring frameworks, resulting in a lack of harmonized and comparable data. Addressing this data gap and enhancing coordination were recognized as essential steps towards comprehensive wildlife monitoring and management.

This meeting provided a valuable opportunity to define the main pathways that should be pursued and subsequently implemented to promote effective wildlife conservation and management in Europe. By addressing the aforementioned challenges, the participants sought to establish a framework for improved management practices, enhanced institutional coordination, and the generation of harmonized data through European-wide monitoring initiatives.

These defined pathways would serve as a roadmap for the project's future endeavours, guiding the implementation of targeted strategies and actions to bridge the gaps and overcome the identified challenges. By adopting this holistic approach, the project aimed to contribute to the preservation of European wildlife and ensure its sustainable coexistence with human activities.

In conclusion, these meetings played a crucial role in facilitating an integrated approach to project activities and defining actions that directly align with the main objectives. By fostering collaboration, synergy, and a clear focus, these meetings ensured that the project progressed efficiently and effectively towards its intended outcomes.

2. The 3rd AGM of the *ENETWILD* project

The 3rd Annual General Meeting (AGM) of the *ENETWILD* project was held on May 24th-25th, 2023 at the Research Institute for Nature and Forest (INBO) in Brussels. This two-day event brought together 52 experts from 24 European countries (Fig. 1) plus *ENETWILD* partners, and including participants from USA and Japan, specializing in wildlife health, population ecology, and management. The AGM served as a central hub for knowledge exchange and collaboration among stakeholders. The participants at the AGM represented a diverse range of interests, ensuring a comprehensive and well-rounded representation of stakeholders involved in the *ENETWILD* project. Respected representatives from project partners, administrative entities, academic institutions, representative organizations, and stakeholder organizations were among the attendees (Fig. 2). This diverse mix of participants enriched the discussions and brought forth a broad range of perspectives, expertise, and experiences.

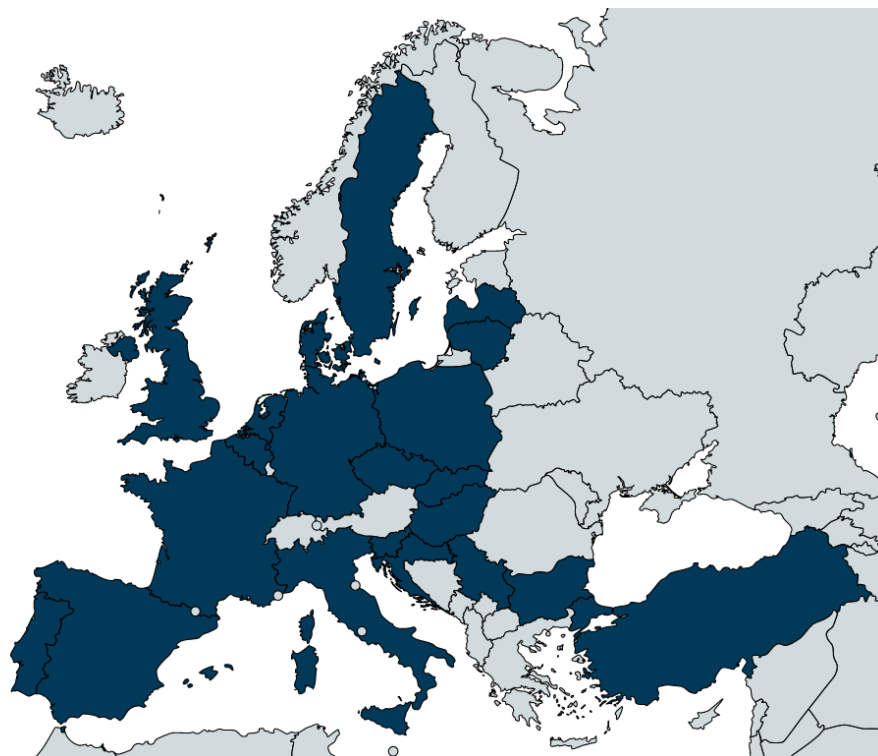


Figure 1. Nationality of the 3rd European AGM participants, plus participants from USA, Japan, and Brazil

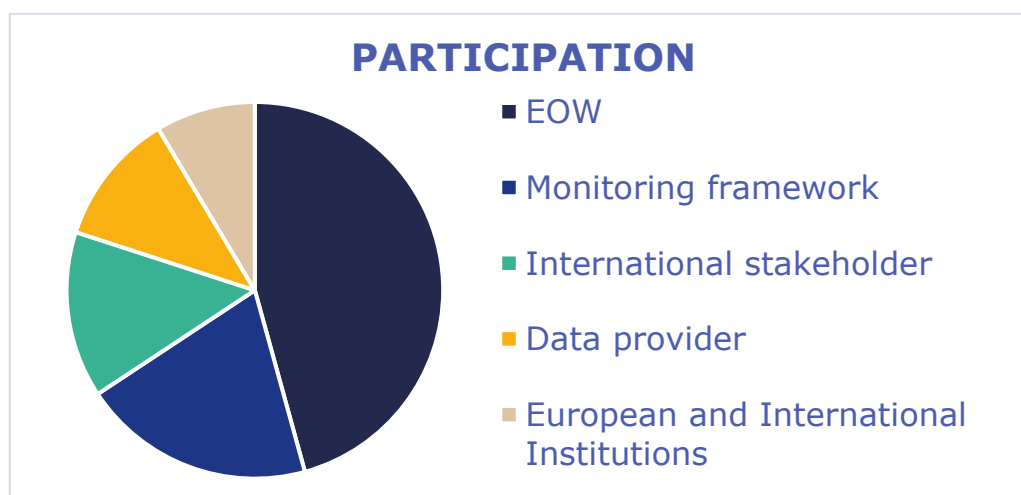



Figure 2. Profiles frequency of participants in the 3rd AGM



The primary purpose of the AGM was to share the latest developments, research findings, and best practices in the field of wildlife monitoring and management. The participants engaged in interactive sessions, workshops, and presentations, facilitating robust discussions on key topics related to wildlife health, population ecology, and effective management strategies. The meeting provided a platform for collaborative decision-making, allowing participants to collectively shape the future directions and strategies of the *ENETWILD* project. Leveraging the collective expertise and knowledge of the attendees, the AGM aimed to define key priorities, establish action plans, and identify areas for further research and collaboration. Additionally, the meeting facilitated networking and relationship-building among the participants. Informal discussions and networking opportunities fostered connections between stakeholders, researchers, and project partners, encouraging future collaborations and the exchange of ideas beyond the meeting itself.

Overall, the 3rd Annual General Meeting of the *ENETWILD* project was a significant milestone in advancing the project's objectives. By convening a diverse group of experts and stakeholders, the meeting served as a catalyst for collective action, knowledge sharing, and collaborative problem-solving. The insights gained and decisions made during the AGM laid the foundation for the project's continued success in addressing wildlife health, population ecology, and effective management strategies.

2.1. Meeting Objectives and anticipated Outcomes

Despite an increasing number of studies and growing awareness of the importance of datasets in predicting the long-term effects of environmental change, Europe still lacks comprehensive wildlife monitoring and management plans that take an international perspective into account. Existing programs often focus on endangered species and specific local habitats, leading to fragmented efforts. However, it is crucial to develop a broader framework that encompasses various wildlife communities, including those that are not necessarily endangered. This approach necessitates the inclusion of species commonly found in agricultural, hunting, and urban areas, as these wildlife communities often contribute to human-wildlife conflicts and can have significant ecological impacts, particularly in disease transmission dynamics.

To address these challenges, the 3rd Annual General *ENETWILD* projects was convened with the primary objective of providing guidance for the establishment of harmonized wildlife population monitoring programs and creating a foundation for international decision-making in Europe. The meeting aimed to present the progress made by *ENETWILD* thus far, including ongoing data collection activities and the formulation of a strategic plan. Additionally, the meeting aimed to showcase the current responsibilities and coordination of wildlife monitoring in Europe, while also exploring the involvement and perspectives of European institutions. Valuable insights were sought from other international contexts that have faced similar challenges and circumstances, fostering knowledge exchange and

facilitating learning from best practices. One of the key objectives was to facilitate in-depth discussions among stakeholders to propose guidelines for the establishment of harmonized wildlife monitoring programs at both national and international levels in Europe. By addressing these objectives, *ENETWILD* aimed to provide guidance for a general framework on how to start up harmonized wildlife population monitoring programs, to provide basis for decision making at international level in Europe.

The **specific objectives** were:

- To present the activities performed by *ENETWILD* so far, including data collection, and a strategic plan.
- To present the current wildlife monitoring responsibility and coordination in Europe, and the involvement and perspectives of European institutions (EU DG Environment, DG for Health and Food Safety).
- To learn from other international contexts facing similar scenarios.
- To discuss and propose guidance on the fundamentals of European harmonized wildlife monitoring at National and international level

The outcomes of this meeting were expected to contribute significantly to the development of robust wildlife monitoring and management plans that address the current and future scenarios of wildlife across Europe. By adopting a harmonized approach and considering a wide range of wildlife communities, these efforts would lead to more integrated and effective conservation strategies, ultimately contributing to the sustainable coexistence of humans and wildlife in Europe. The workshop and discussions were guided by the aforementioned assumptions, which helped establish the key objectives and expected outcomes of the meeting.

The following are the **expected outcomes** of the meeting:

- **Providing Guidance for a General Framework:** The workshop aimed to generate recommendations for a comprehensive framework that facilitates the initiation of wildlife population monitoring programs. This framework would be harmonized to ensure consistency and enable informed decision-making at the international level in Europe.
- **Agreement on Common Objectives:** The stakeholders sought to reach a consensus on shared objectives, particularly in terms of monitoring species of concern or those that present challenges. This agreement would extend beyond the scope of individual species action plans and foster collaboration among stakeholders.
- **Recommendations for Implementing Population Monitoring:** The workshop aimed to provide practical recommendations on how to implement population monitoring within the context of an adaptive wildlife management framework.

These recommendations would offer guidance on effective strategies and best practices for monitoring wildlife populations.


- **Strengthening the *ENETWILD* Network:** One of the desired outcomes was to enhance and expand the network of data providers and contributors to *EOW*, (<https://wildlifeobservatory.org/>). This network would facilitate the collection, sharing, and analysis of data, contributing to the long-term sustainability of the project.
- **Identifying Legislative Needs and Administrative Roles:** The workshop intended to compile a list of requirements and needs concerning specific legislation relevant to wildlife monitoring. Additionally, it aimed to identify the roles and responsibilities of administrative bodies at the European level, ensuring effective coordination and support for wildlife monitoring initiatives.

By achieving these outcomes, the workshop aimed to foster strong collaboration and cooperation among stakeholders involved in wildlife population monitoring. The practical guidance and recommendations developed during the workshop would serve as valuable resources for designing and implementing effective monitoring programs. These initiatives are crucial for establishing a robust framework that supports the long-term sustainability of wildlife populations in Europe.

The establishment of a comprehensive framework for wildlife population monitoring would contribute significantly to conservation efforts. It would enhance our understanding of population dynamics, species distribution, and habitat requirements, enabling proactive conservation planning and the identification of priority areas for protection. This, in turn, would support the preservation of biodiversity, the protection of endangered species, and the maintenance of healthy ecosystems. Moreover, the workshop's outcomes provided a strong foundation for long-term monitoring and assessment of wildlife populations in Europe. By strengthening the network of data providers and contributors to *EOW*, the availability of high-quality data would be ensured. These data would not only support ongoing research and monitoring efforts but also facilitate the evaluation of conservation interventions and the tracking of progress over time. Ultimately, the workshop's objectives align with the overarching goal of safeguarding wildlife populations and their habitats. By promoting collaboration, providing practical guidance, and establishing a robust monitoring framework, the workshop's outcomes would contribute to the sustainable management of wildlife, the protection of biodiversity, and the preservation of Europe's natural heritage for future generations.

By achieving these outcomes, the workshop aimed to foster collaboration, provide practical guidance, and establish a robust framework for wildlife population monitoring, ultimately contributing to improved decision-making and conservation efforts at the European level.

2.2. The introductory session as a foundation for the workshop



The workshop encompassed group sessions, which were followed a series of informative lectures at the introductory session, providing participants with valuable insights into the progress and activities accomplished within the *ENETWILD* project. These lectures served as a precursor to the group sessions, equipping participants with a comprehensive understanding of the project's advancements and setting the stage for productive discussions during the 3rd Annual General Meeting. By attending the lectures, participants gained a broader perspective on the project's current status and its trajectory. They were able to grasp the achievements, challenges, and ongoing initiatives within *ENETWILD*, enabling them to approach the group sessions with a deeper understanding of the project's potential directions and objectives.

The lectures offered an opportunity for knowledge exchange and facilitated the sharing of updates from different areas of the project. Participants learned about key milestones, research findings, technological developments, and collaborative efforts made by various teams and partners involved in *ENETWILD*. This comprehensive overview helped participants identify areas of interest and potential avenues for collaboration during the subsequent group sessions.

The lectures presented during the workshop not only highlighted the progress within the *ENETWILD* project but also showcased practices and experiences from other parts of the world. These international examples provided valuable insights and alternative approaches that can contribute to the development of data acquisition and wildlife population management strategies in Europe. By featuring practices from diverse regions, the lectures offered a broader perspective on innovative methodologies, technologies, and management techniques used in different parts of the world. Participants had the opportunity to learn about successful case studies, lessons learned, and best practices employed in wildlife monitoring and management beyond the European context. The inclusion of international examples stimulated creative thinking and sparked discussions on how such practices could be adapted and implemented in the European context. Participants were encouraged to explore potential transferable solutions, evaluate their applicability, and consider their potential impact on enhancing data acquisition and wildlife population management within Europe. It provided a valuable insight into different approaches to data collection, monitoring techniques, community engagement, and conservation strategies. This broader knowledge base enriched the discussions and allowed for the exploration of innovative solutions that may not have been previously considered.

By incorporating international perspectives, the lectures encouraged participants to think beyond their immediate context and consider novel strategies that could contribute to advancing wildlife population management in Europe. The exchange of ideas and experiences from around the world provided inspiration and valuable lessons that can shape the future direction of the *ENETWILD* project and related initiatives. The inclusion of practices from other parts of the world within the lectures broadened participants' horizons and stimulated innovative thinking. By showcasing international experiences, the lectures

opened up possibilities for adopting successful approaches to data acquisition and wildlife population management in Europe. The exchange of ideas and cross-cultural learning contributed to a more comprehensive and well-informed discussion during the workshop, enhancing the potential for effective and impactful outcomes.

By featuring presenters from diverse institutions, the introductory session ensured a multi-dimensional view of wildlife population monitoring and management. The collective expertise and experiences of these presenters enriched the workshop's discussions, enabling participants to gain valuable insights from various sectors and disciplines. The introductory session featured presenters from institutions including research institutes, academic organizations, wildlife conservation organizations, government agencies, and international organizations. The diverse range of institutions represented ensured a comprehensive understanding of wildlife population monitoring and management, incorporating perspectives from research, policy, and practical implementation.

The program for the workshop is outlined below, providing a clear overview of the sessions and activities (Table 1). Access to the recordings of the lectures can be obtained through the links provided in Annex 1.

Table 1. Detailed programme of the III AGM.

Wednesday 24th May PM	
13:00 - 14:00	Registration participants <i>European institutions involved in wildlife monitoring</i>
14:00 - 14:15	Welcome address. EFSA's mission statement and involvement in <i>ENETWILD</i> . EFSA. Alessandro Broglia. EFSA.
<i>Achievements of ENETWILD project</i>	
14:15 - 14:50	ENETWILD: overview of activities performed. organization of the AGM (workshops). Joaquín Vicente. ENETWILD.
14:50 - 15:05	ENETWILD: population data collection activities and proposals for automatising and streamlining the process Kamila Plis. ENETWILD
15:05 - 15:20	ENETWILD: Contributions to European coordinated surveillance programmes under the One Health (OH) approach for cross-border pathogens that threatens the Union. Ezio Ferroglio
15:20 - 15:30	Presentation of ASF Stop campaign. Lina Mur. EFSA.
15:30-16:00	Coffee Break
<i>Wildlife monitoring in Europe</i>	
16:00 - 16:20	What is wildlife monitoring, why harmonized wildlife monitoring at National and international level. Joaquín Vicente. ENETWILD.
16:20 - 16:40	Current situation in Europe: Wildlife monitoring responsibility and coordination. Neglected species. Oliver Keuling. ENETWILD.
16:40 - 17:05	International Single Species Action Plans for wild species in Europe: the case of greylag goose. Gitte Høj Jensen & Jesper Madsen. AEWA, Aarhus Univ.

17:05 - 17:20	EuropaBon: Towards the implementation of a European biodiversity observation network. Maria Lumbierres (EuropaBon).
17:20 - 17:50	Looking abroad: US Federal program for feral pig monitoring and population control: lessons applicable to wild boar control in Europe. Kurt C. Vercauteren USDA, Nat. Wild. Center.
17:50 - 18:00	Remarks of first day

Thursday 25th May – Whole day

The foundations of harmonized wildlife monitoring in Europe

8:50 - 9:20	Wildlife monitoring as a predefined system: Requirements of European wildlife monitoring national plans, what to monitor? Massimo Scandura & Jim Casaer. ENETWILD.
9:20 - 9:40	How to monitor? General approach and design. Tomasz Podgorski. ENETWILD.
9:40 - 10:00	Improving the efficiency of sampling designs. JA Blanco-Aguilar & Pelayo Acevedo. ENETWILD.
10:00 - 10:30	Coffee Break
10:30 - 10:50	Data management and documentation. Graham Smith. ENETWILD.
10:50 - 11:10	IT tools at the service of wildlife monitoring. Yorick Liefing. ENETWILD.
11:10 - 11:35	European coordinated surveillance programmes under the One Health (OH) approach for cross-border pathogens that threatens the Union: recommendations for integrated wildlife monitoring. Dolores Gavier-Widen. ENETWILD- SLA
11:35 - 12:00	The Scandinavian model of wildlife monitoring and management. Lars Hillström. Univ. of Gävle
12:00 - 13:10	Lunch
13:00 - 13:50	Looking abroad: A strategy for wildlife monitoring and management in Japan. Hiroshi Tsunoda. Center for Environmental Science in Saitama.

Working group session.

13:50 - 14:30	European harmonized wildlife monitoring. 4 groups addressing the following topics, respectively: Objectives (do we have common objectives?) and evaluation (adaptive framework). Design and applied methodology for harmonized wildlife monitoring. Wildlife Data collection streamlining at European level; automatise and streamline data flow. Proposals for data management and documentation.
14:30 - 15:00	Coffee break
15:00 - 15:30	Working groups discussions (cont.)
15:30 - 17:10	Concluding discussions/inputs on the working group
17:10 - 17:30	Resume session and wrap up Summaries as a conclusion from the sessions. Open items needed further discussion and a job list (to-dos) identified in discussion groups. Presented by chairs/discussion group speakers. Wrap-up.

2.3. Discussion during workshops

During the Working Group Sessions all participants were allocated to individual groups, ensuring diverse representation within each group. This approach aimed to generate integrated conclusions that accurately reflected the real needs and perspectives of all involved parties. By incorporating various stakeholder groups in the discussions, the Working Group Sessions fostered a comprehensive and well-rounded exploration of the topics at hand. The inclusive nature of the groups encouraged active engagement, collaboration, and the exchange of diverse insights and experiences. The outcomes and findings from all the groups were consolidated and presented during a summary session.

The detailed results and outcomes of these discussions will be presented in the following sections. These findings provide valuable recommendations and potential pathways identified by each group. By incorporating the perspectives of different stakeholders, the results highlight a comprehensive and balanced approach to addressing the challenges and seizing the opportunities discussed during the meeting.

2.3.1. Working group session objectives and tasks

The primary objective of the Working Session was to facilitate the exchange of experiences among the participants, fostering a collaborative learning environment. The working group sessions of the workshop were centred around the theme of European harmonized wildlife monitoring. Four groups were established to address specific topics, namely:

Group 1: Objectives and Evaluation

Objective: Assess the existence of common objectives across different wildlife monitoring initiatives and explore the potential for developing an adaptive framework.

Tasks:

- a) Identify existing objectives within European wildlife monitoring projects.
- b) Evaluate the feasibility of aligning objectives to create a common framework.
- c) Discuss approaches for adaptive management and evaluation of wildlife monitoring programs.
- d) Identify key challenges and potential solutions for implementing an adaptive framework.

Group 2: Design and Methodology for Harmonized Wildlife Monitoring

Objective: Explore the design and methodology aspects necessary for achieving harmonized wildlife monitoring practices across Europe.

Tasks:

- a) Identify key considerations for harmonizing study design, sampling protocols, and data collection methods.
- b) Discuss the use of standardized approaches in the data collection.
- c) Address challenges related to variations in habitat types, species diversity, and data quality control.
- d) Propose strategies for harmonizing data analysis and interpretation to facilitate cross-site comparisons.

Group 3: Wildlife Data Collection Streamlining at the European Level

Objective: Streamline and automate the flow of wildlife data collection at the European level.

Tasks:

- a) Identify existing data collection practices and workflows within European wildlife monitoring initiatives.
- b) Discuss opportunities for automating data collection, including the use of remote sensing technologies and citizen science approaches.
- c) Address issues related to data standardization, metadata requirements, and data sharing protocols.
- d) Propose recommendations for streamlining data flow and ensuring efficient data collection processes.

Group 4: Data Management and Documentation

Objective: Develop proposals for effective data management and documentation practices in European harmonized wildlife monitoring.

Tasks:

- a) Discuss data management challenges, including data storage, quality control, and access.
- b) Address issues related to metadata standards, data interoperability, and long-term data archiving.
- c) Explore approaches for data documentation, including metadata templates, data dictionaries, and data publication protocols.
- d) Propose recommendations for ensuring data discoverability, accessibility, and reusability within the European harmonized wildlife monitoring context.

By dividing participants into these working groups and outlining specific objectives and tasks, the workshop aimed to foster focused discussions, knowledge sharing, and the generation of practical recommendations. The objective of these group sessions was to contribute to advancing the goal of harmonized wildlife monitoring in Europe and lay the foundation for future collaborative efforts in this field.

The comprehensive outcomes of each group were presented and discussed in the subsequent sections, providing a holistic view of the collective results. A summary of conclusions is presented in a separate section, followed by several final remarks. To ensure the workshops' effectiveness, we merged and integrated the conclusions, proposals, and recommendations obtained by different breakout groups that addressed the same questions in parallel (refer to the organization of workshops above).

2.3.2. Group 1: Objectives and Evaluation

Objective: Assess the existence of common objectives across different wildlife monitoring initiatives and explore the potential for developing an adaptive framework.

Chair: Oliver Keuling, Jim Casaer and Joaquin Vicente

The primary focus of this group was to identify and evaluate existing objectives among various wildlife monitoring initiatives and to investigate the potential for establishing an adaptive framework. Although the objectives within each initiative might differ based on their specific aims and goals, several common points was addressed:

- **Population Assessment:** One key objective is to assess and monitor wildlife populations across Europe. This involves estimating population size, density, distribution, and demographic trends of various species. Understanding population dynamics is crucial for evaluating the health, status, and conservation needs of wildlife populations.
- **Biodiversity Monitoring:** European wildlife monitoring projects often aim to monitor and assess biodiversity at different spatial scales. The objective is to understand the composition, abundance, and diversity of species within specific habitats or regions. Biodiversity monitoring helps identify areas of high ecological importance, track changes over time, and guide conservation efforts.
- **Threat Monitoring:** Many European wildlife monitoring projects focus on identifying and monitoring different threats both to wildlife as well as to human health and economy. This includes monitoring the impacts of habitat loss, pollution, climate change, presence and impact of invasive species, disease transmission and outbreaks. The objective is to understand the underlying factors that affect population viability and guide conservation strategies which will help to balance.
- **Data Sharing and Collaboration:** Many projects emphasize the objective of promoting data sharing, collaboration, and harmonization among different monitoring initiatives. This objective aims to enhance data comparability, facilitate cross-site analyses, and support evidence-based decision-making across Europe.

Participants of the workshop, agreed, that the European wildlife monitoring play a vital role in enhancing our understanding of wildlife populations, their habitats, and ecosystems. Through systematic data collection, rigorous analysis, and scientific research it might to provide valuable insights and evidence that can guide conservation strategies, inform policy decisions, and support long-term planning. Additionally, the implementation of an adaptive management policy can be crucial in this context. Adaptive management allows for the integration of new knowledge and insights gained from monitoring activities, thereby facilitating improved decision-making processes. By continuously learning from the data collected, monitoring initiatives can enhance their understanding of ecological processes and refine their management approaches. This adaptive approach ensures that conservation and management practices remain effective and responsive to changing environmental conditions and emerging challenges.

Participants also defined more detailed objectives that are important for all parties involved in wildlife conservation activities. These objectives encompass a wide range of aspects related to understanding, managing, and protecting wildlife populations. The identified objectives are as follows:

1. Evidence trends or gradients, obtain baseline data to compare over space, management, and socio-economic contexts at the European level: This objective emphasizes the importance of collecting data to track trends and variations in wildlife populations and their habitats across Europe. It aims to establish a baseline for comparison and provide insights into the impacts of management actions and socio-economic factors.
2. Determining how essential ecological, epidemiological, and socio-economic processes operate at national and European levels: This objective focuses on understanding the underlying processes that influence wildlife populations, including ecological, epidemiological, and socio-economic factors. It aims to evaluate and address the causes of issues such as perceived overabundance, considering factors beyond local contexts.
3. Calibrate and better understand the relationship between population abundance and damage: This objective recognizes that the relationship between population abundance and damage is complex and influenced by human-driven factors. It seeks to gain a better understanding of this relationship, which can vary across regions and Europe, and to identify the factors that contribute to population impacts and damage.
4. Identify the preferred or necessary habitats and infrastructures for species and their impacts: This objective emphasizes the importance of understanding the spatial distribution of habitats and infrastructures that are crucial for wildlife species. It aims to identify key areas and resources that support species populations and their impacts across Europe.

5. Identify risk factors for pathogens under One Health (OH) approach: This objective focuses on identifying and monitoring risk factors associated with the transmission of pathogens between wildlife, domestic animals, and humans. It aims to enhance the understanding of disease dynamics and develop strategies for disease prevention and control.
6. Early detection of potential threats to biodiversity and human-wildlife conflict (HWC): This objective highlights the importance of early detection and proactive measures to address threats to biodiversity and human-wildlife conflict. It aims to develop strategies for timely intervention and minimize the economic, social, and environmental costs associated with conflicts and biodiversity loss.
7. Evaluate and adaptively manage the fulfilment of objectives at the European level: This objective emphasizes the need for coordinated evaluation and adaptive management of wildlife populations and their management strategies at the European level. It aims to modify and adapt policies and management approaches based on context-specific feedback and mutual collaboration.
8. Sensitize stakeholders and society on the importance of wildlife monitoring and management: This objective focuses on raising awareness among stakeholders and society about the significance of wildlife monitoring and management. It aims to integrate ecological and social approaches to promote the socio-economic sustainability of monitoring efforts in Europe.

These objectives reflect the multifaceted nature of wildlife monitoring and management, encompassing ecological, social, and economic dimensions. By addressing these objectives, stakeholders can work together to achieve effective wildlife conservation and sustainable management practices in Europe.

Other important aspect is assessing the feasibility of aligning objectives to create a common framework involves evaluating various factors. These factors include analysing the objectives of different stakeholders or monitoring initiatives, engaging with stakeholders to understand their perspectives and willingness to align objectives, assessing compatibility of objectives, evaluating resource availability, considering governance and coordination mechanisms, assessing technical considerations, examining legal and policy frameworks, and evaluating the flexibility and adaptability of the framework. By conducting a thorough evaluation of these factors, it becomes possible to determine the feasibility of aligning objectives and creating a common framework, which is essential for successful implementation of a unified approach to wildlife monitoring.

During the workshop, participants agreed that several key elements need to be addressed in order to enable the creation of a common framework. These elements are crucial for fostering collaboration and ensuring the success of the framework. The following key elements were identified:

1. Stakeholder Alignment

Need to:

- Assess the willingness and commitment of stakeholders involved in wildlife monitoring to align their objectives. This includes government agencies, research institutions, NGOs, citizen science groups, and other relevant organizations.
- Evaluate their capacity and readiness to collaborate, share data, and work towards a common framework.

2. Compatibility of Objectives

Need to:

- Determine the compatibility of objectives across different monitoring initiatives.
- Identify areas of overlap, common themes, and shared goals.
- Assess whether the objectives can be harmonized or integrated into a unified framework without compromising their integrity or unique characteristics.

3. Consensus Building

Need to:

- Facilitate discussions and engagement among stakeholders to foster consensus on shared objectives.
- Encourage open dialogue, exchange of ideas, and collaborative decision-making processes.
- Identify areas of agreement and work towards finding common ground among diverse perspectives.

4. Data Compatibility and Integration

Need to:

- Assess the feasibility of aligning data collection methods, protocols, and standards to ensure data compatibility and integration.
- Evaluate whether existing data can be harmonized or if modifications are required to facilitate data sharing, comparability, and analysis across monitoring initiatives.

5. Practical Implementation

Need to:

- Evaluate the practicality of implementing the common framework within the existing institutional and regulatory frameworks.
- Consider the legal and administrative requirements, policy considerations, and potential barriers that may need to be addressed to ensure successful implementation.

By assessing these aspects, it becomes possible to evaluate the feasibility of aligning objectives and creating a common framework for wildlife monitoring. Collaboration, consensus-building, flexibility, resource availability, data compatibility, and practical implementation considerations play significant roles in determining the feasibility and success of establishing a unified approach to wildlife monitoring.

In addition to the evaluation, the following essential activities that should be undertaken:

1. Evidencing trends or gradients to obtain baseline information and compare trends over space, management approaches, and socio-economic contexts at the European level.
2. Determining processes at the national and European levels to understand the evaluation processes and causes that extend beyond local contexts, particularly in relation to problematic issues such as perceived overabundance of certain species.
3. Calibrating and gaining a better understanding of the relationship between population abundance and damage to provide sustained long-term monitoring and analysis of relevant factors to better understand the relationship between population abundance and the associated damages or impacts.


By undertaking these activities, the common framework for wildlife monitoring can contribute to evidence-based decision-making, effective management strategies, and the conservation of biodiversity and ecosystems.

2.3.3. Group 2: Design and Methodology for Harmonized Wildlife Monitoring

Chair: Tomasz Podgorski, Jose A. Blanco-Aguilar, Jolianne Rijks, Javier López

During the workshop, Group 2 focused on discussing the design and methodology for harmonized wildlife monitoring. The participants engaged in detailed discussions addressing various aspects of designing an effective monitoring program. They agreed that to achieve harmonized monitoring, seven main aspects need to be addressed for each monitoring objective. These aspects include:

1. **Target Parameters:** Clearly defining the specific parameters to be monitored, such as population dynamics, disease prevalence, habitat quality, or human-wildlife conflict indicators. This ensures that the monitoring program aligns with the desired objectives.
2. **Spatial Range:** Determining the appropriate spatial scale for monitoring efforts, including the selection of study areas and the representation of different ecosystems or habitats. This ensures that the monitoring program captures the necessary spatial variation.
3. **Spatial Resolution:** Defining the level of detail required in spatial data collection, considering factors such as the size of monitoring units, sampling design, and precision of spatial data. This ensures that the monitoring program captures the necessary spatial information.
4. **Time Resolution:** Determining the appropriate temporal scale for data collection, considering factors such as breeding seasons, migration patterns, and long-term population trends. This ensures that the monitoring program captures the necessary temporal variation.
5. **Precision and Accuracy of Measurements:** Ensuring that data collection methods and measurement techniques are precise and accurate to obtain reliable and meaningful results. This includes standardizing protocols, implementing quality control measures, and considering the limitations and sources of error in data collection.
6. **Representativity:** Considering whether a risk-based approach or random (including stratified) sampling design is more appropriate for the specific monitoring objective. This ensures that the monitoring program captures representative data across different risk or interest areas.
7. **Direct Measures and Use of Indicators:** Evaluating whether direct measures or the use of indicators provide the most practical and informative data for the monitoring objective. This includes assessing the comparability, practicality, and relevance of different monitoring approaches.




Based on the extensive discussions held during the workshop, it is now possible to offer recommendations for integrating national wildlife monitoring plans at the European level. By addressing the seven key aspects outlined earlier, national monitoring plans can align their objectives, methodologies, and data collection practices, leading to harmonization and the establishment of a common framework for wildlife monitoring throughout Europe. The workshop participants also provided illustrative examples of key elements that can be implemented while evidencing trends or gradients, obtaining baseline data to compare over space, management, and socio-economic contexts at the European level (Table 2).

These considerations are intended to serve as a guiding framework for the collection and analysis of data in wildlife monitoring projects. By targeting diverse parameters, making appropriate choices regarding spatial and temporal resolutions, ensuring precision and accuracy in measurements, achieving representativity, and judiciously selecting between direct measures and indicators based on their suitability for management purposes, wildlife monitoring programs can effectively track trends, establish baseline data, and compare information across various spatial, management, and socio-economic contexts at the European level. By adhering to these objectives, wildlife monitoring initiatives can enhance their effectiveness and contribute significantly to the understanding and conservation of Europe's diverse wildlife populations and ecosystems.

Table 2: Example of recommendations how objectives should be addressed.

<i>Objective</i>	<i>Evidence trends or gradients, obtain baseline data to compare over space, management and socio-economic contexts at Eur level</i>
Target parameters	Diverse parameters potentially: Target (e.g. Population, disease, other HWC parameters)
Spatial range	<ul style="list-style-type: none"> • Baseline data: ensure representativity and/or geographical variation. • Consider risks (factors), parameters should be linked over study areas/populations. • Consider appropriate time scale.
Spatial resolution	Determined by factors evaluated (e.g. spatial resolution at which management occurs, adaption to administrative units for practical reasons, ecological units vs management units)
Time resolution	Consider at what time scale factor operate. Sometimes determined by data collection (e.g. hunting statistics), Generally, annual. Season influence parameters, such as population dynamics (abundance highest immediately post breeding)
Precision and accuracy of measurements	Generally, accuracy more relevant to approach central values and trends (specially, intra-population trend). For obtaining reference data (for further comparison), good accuracy and precision are needed. Observatory vs "low reliable data but abundant" approach
Representativity: Risk based vs random (inc. stratified)	Risk (factor) based sampling design selection of study areas) relevant when a priory factor or scenarios has been pre-selected and/or are relevant.
Direct measures/ Use of indicators	Does indicator provide al we need /e.g. abundance index provide. similar practical info to density for management), are indicators comparable over time, study areas, countries. Are indicators more practical than direct measure. In general, direct measure 8e.g. density preferred than abundance indexes as they are comparable if harmonized methods has been applied



As stated by the workshop participants, one of the most important parts of designing standardized methodology was launch of the European Observatory of Wildlife (EOW). It played a pivotal role as an exemplary model demonstrating how monitoring can be meticulously planned, efficiently managed, and successfully executed on a European scale. The EOW's significance arises from its ground breaking efforts in initiating activities that span a broad geographical area in Europe, providing consistent and standardized data. Furthermore, the project's utilization of various innovative methods, such as centralized data repositories, standardization of data protocols, remote animal observation techniques, and the application of open-source software and AI analysis, ensures widespread accessibility and potential scalability without incurring additional expenses.

2.3.4. Group 3: Wildlife Data Collection Streamlining at the European Level

Chair: Kamila Plis, Massimo Scandura, Stefania Zanet and Dolores Gavier-Widen

Wildlife Data Collection Streamlining at the European Level refers to the efforts and initiatives aimed at improving the efficiency, standardization, and harmonization of data collection processes across European wildlife monitoring initiatives. The objective is to establish a cohesive and streamlined approach to gathering data on wildlife populations, habitats, and associated factors at a continental scale. This initiative recognizes the need for comprehensive and reliable data to support evidence-based decision-making, conservation efforts, and the sustainable management of wildlife.

Participants agreed, that to achieve the goal of streamlining data collection, several key areas have to be addressed:


- **Standardization of Data Collection Methods:** The initiative focuses on promoting the adoption of standardized data collection methods and protocols. This involves establishing guidelines and best practices that ensure consistency and comparability of data collected across different projects and regions. Standardized methods improve data quality, enhance data integration, and facilitate meaningful analysis and interpretation of results.
- **Integration of Technological Advancements:** The initiative embraces the utilization of emerging technologies in wildlife data collection. This includes the deployment of camera traps and possibly expanding it to GPS tracking systems, and environmental sensors, to gather specific information on species presence, behaviour, and environmental parameters.
- **Data Management and Sharing:** Effective data management and sharing mechanisms are critical for streamlining data collection at the European level. The initiative encourages the implementation of robust data management systems, including data storage, quality control, and metadata documentation. It promotes the

use of standardized data formats and protocols for data sharing, ensuring interoperability and facilitating collaboration among different stakeholders.

- **Collaboration and Partnership:** Collaboration among diverse stakeholders, including government agencies, research institutions, NGOs, citizen science groups, and other relevant organizations, is fundamental to the success of wildlife data collection streamlining. The initiative fosters partnerships and collaborative networks, facilitating the exchange of knowledge, resources, and expertise. By working together, stakeholders can leverage their collective strengths, share data, and address common challenges in a coordinated manner.
- **Capacity Building and Training:** The initiative recognizes the importance of building capacity and providing training opportunities to enhance the skills and knowledge of professionals involved in wildlife data collection. Capacity building programs focus on developing expertise in data collection methodologies, data analysis techniques, and data management practices. By investing in capacity building, the initiative ensures a well-trained workforce capable of implementing standardized and efficient data collection processes.

Wildlife Data Collection Streamlining at the European Level can optimize the collection of wildlife data, improve data quality and comparability, and facilitate data integration and analysis. The workshop placed also significant emphasis on the objective of improving data collection methods and devising effective strategies to tackle this challenge. Throughout the discussions, participants identified several critical issues that often lead to significant delays and challenges during the data collection process. Key issues raised include:

1. **Different Formats for Data Deposition:** The existence of diverse formats for depositing data creates complications when attempting to standardize and integrate datasets. This lack of uniformity hampers the harmonization and analysis of collected data.
2. **Insufficient Digitalization of Data:** The limited availability or low level of digitalization of data poses obstacles to efficient data management and utilization. Manual or paper-based systems hinder the accessibility and sharing of information, impeding collaborative efforts.
3. **Lack of Cooperation:** A notable challenge identified during discussions was the lack of willingness among data depositors to cooperate and share data. This is mainly visible among scientists, who could provide detailed data about species and This reluctance to collaborate inhibits the establishment of comprehensive datasets and impedes the ability to generate holistic insights.
4. **No Data Sharing Agreement:** Even if people are willing to share their data, there is a problem with signing an official Data Sharing Agreement. This issue is particularly prominent among stakeholders, as the decision of who should officially sign such agreements is not usually clearly defined. As a result, nobody wants to take direct responsibility.



There are two additional issues, which are directly connected to the data quality:

5. **Incomplete Data Collection:** Insufficient coverage or gaps in data collection can lead to incomplete or biased datasets, limiting the effectiveness of wildlife monitoring efforts.
6. **Data Quality Issues:** Inaccurate or inconsistent data recording practices, data entry errors, or lack of standardization can affect the quality and reliability of the collected data.

Addressing these issues is essential to streamline data collection processes, improve data quality, and promote effective collaboration. By developing standardized data deposition formats, promoting digitalization efforts, and fostering a culture of cooperation among data depositors, it becomes possible to enhance the overall effectiveness and efficiency of data collection initiatives.


One of the most frequently raised question was: who should be the data provider to ENETWILD? Should it be the administrations directly, such as wildlife or hunting services, or should we also consider involving our colleagues from academia, who are frequent data providers?

It is essential to carefully consider the roles and expertise of potential data providers in the *ENETWILD* project. Administrations, such as wildlife or hunting services, have direct access to official records and data related to wildlife populations and hunting activities. They possess valuable insights into the management and regulatory aspects of wildlife monitoring. Their involvement can ensure the availability of comprehensive and authoritative data. On the other hand, academia and research institutions have extensive experience in conducting scientific studies and research projects related to wildlife. They contribute significantly to the scientific understanding of wildlife populations, behaviour, and ecological processes. Their involvement as data providers can enhance the scientific rigor and depth of the ENETWILD project. Participants agreed, that a collaborative approach that involves both administrations and academia as data providers can be beneficial. Administrations can provide official records and data, ensuring the representation of the regulatory and management aspects. Academia can contribute with their research expertise, methodological advancements, and scientific insights. This collaboration can lead to a more comprehensive and robust dataset, capturing both the regulatory and scientific dimensions of wildlife monitoring.

Group 4: Data Management and Documentation

Chair: Graham Smith, Yorick Liefting and Guillaume Body

During the workshop participants agreed that data management and documentation are pivotal for enhancing the overall effectiveness of wildlife monitoring initiatives. These processes enable data integration, improve data quality, facilitate collaboration, and support evidence-based decision-making for wildlife conservation and sustainable management. Given the presence of multiple wildlife monitoring initiatives at national and international levels, it become more important to establish standardized practices for data management and documentation. The implementation of proposals ensures that data is collected, stored, and shared in a consistent and uniform manner, thus promoting seamless integration and comparison of data across various projects.




Wildlife data holds also a significant value for scientific research, conservation efforts, and policy-making. The adoption of proposals for data management and documentation promotes open data sharing practices, thereby enabling easy accessibility of information to researchers, conservationists, and decision-makers. This accessibility fosters collaboration encourages data-driven decision-making, and bolsters transparency in wildlife monitoring endeavours. Moreover, the adoption of standardized protocols and guidelines ensures that data is collected using uniform methods, reducing the likelihood of errors and enhancing the reliability of the information. Additionally, well-documented data allows for better scrutiny and validation of findings, instilling greater confidence in the accuracy of the results.

Properly managed and documented data also facilitates adaptive management practices. By collecting and organizing monitoring data consistently, it becomes simpler to identify emerging threats, assess the effectiveness of conservation measures, and make timely adjustments to management strategies based on newly acquired information.

Participants stated that proposals for data management and documentation are vital components of wildlife monitoring efforts. They play a central role in data integration, quality improvement, collaborative endeavours, and informed decision-making for wildlife conservation and sustainable management. The implementation of standardized practices ensures efficient data sharing, empowers scientific research, and enables the formulation of effective policies aimed at safeguarding biodiversity and the environment.

During the workshop participants agreed on several proposals for Data Management and Documentation, which can be:

1. **Open Data Sharing:** All record data should be made openly available with a Creative Commons Attribution (CC-BY) license to promote widespread use and collaboration among researchers and stakeholders.
2. **Data Resolution:** Record data should be reported at the highest resolution possible while respecting privacy regulations and applying anonymization techniques for sensitive or rare species.
3. **Meta-data and Secondary Data:** While certain data cannot be included in GBIF, the publication of meta-data and secondary data on pre-print servers is essential for documenting study designs and outlining the geographic scope of the data.
4. **Engaging Camera Trap Users:** Active efforts should be made to engage camera trap users to contribute to international studies and encourage them to submit data following the proposed guidelines.
5. **Continuous Documentation:** Documentation, including protocols and roles, should be a continuous and coordinated effort at the international level to ensure consistency and harmonization across monitoring initiatives.
6. **Utilizing IT Solutions:** Implementing IT solutions and applications, such as the web app being developed for the European Food Safety Authority (EFSA), can greatly enhance data management, integration, and accessibility, thereby improving the overall effectiveness of wildlife monitoring.



By adopting these proposals, wildlife monitoring projects can streamline their data management and documentation processes, optimize data sharing, and advance harmonization efforts, ultimately contributing to a more efficient and cohesive approach to wildlife monitoring at the national and international levels.

3. Conclusions of the 3rd AGM of ENETWILD

Experts, stakeholders and *ENETWILD* collaborators addressed through discussion the necessary steps towards improving harmonised national and international wildlife monitoring for coordinated wildlife decision-taking in Europe during the 3rd Annual General Meeting of *ENETWILD*. The approach underlying the discussions was that wildlife monitoring must be an inherent part of the process of informed management and that focus must be necessarily international.

Next, the conclusions are summarised around specific questions. In another section below, the main final remarks in relation to the development of relevant progress on harmonised, coordinated, and integrated wildlife monitoring at a European level in the short/medium-term, are presented.

In the context of harmonized wildlife population monitoring programs at the European level, several **KEY GAPS** or **CHALLENGES** can be identified. These gaps may hinder the seamless integration and effectiveness of monitoring efforts. Some of the key gaps include:

1. **Lack of Standardization:** One of the major challenges is the lack of standardized methods and protocols across different monitoring initiatives. Differences in data collection techniques, sampling methods, and data reporting formats make it difficult to compare and integrate data from various programs.
2. **Fragmentation of Efforts:** The presence of multiple wildlife monitoring initiatives across different countries and regions leads to fragmentation of data and efforts. Lack of coordination and harmonization among these initiatives hinders the establishment of a cohesive and comprehensive European-wide monitoring network.
3. **Data Sharing and Access:** Limited data sharing and accessibility can be a significant gap in harmonized monitoring programs. Data ownership issues, data privacy concerns, and reluctance to share data between different stakeholders and countries can hinder the development of a unified monitoring framework.
4. **Inconsistent Spatial and Temporal Coverage:** In some regions, monitoring efforts may be concentrated, while other areas may have limited or no monitoring data. Inconsistent spatial and temporal coverage can result in data gaps and limit the ability to assess wildlife populations across Europe comprehensively.
5. **Lack of Long-Term Monitoring:** Continuous, long-term monitoring is essential for understanding population trends and ecological changes. However, the lack of sustained funding and resources for long-term monitoring programs can lead to gaps in data continuity.
6. **Insufficient Integration of Emerging Technologies:** While some monitoring programs have adopted modern technologies such as remote sensing, AI, and advanced

statistical methods, there is still room for greater integration of these technologies across all monitoring initiatives to enhance data collection, analysis, and interpretation.


7. **Limited Coordination and Governance:** Effective coordination and governance mechanisms are crucial for harmonizing monitoring efforts at the European level. The absence of a centralized coordinating body or platform can impede collaboration and data sharing among different stakeholders.
8. **Lack of Harmonized Objectives:** Diverse monitoring initiatives may have varying objectives, leading to challenges in aligning and harmonizing these objectives across different programs. Clear and common goals are essential for creating a cohesive monitoring framework.
9. **Policy and Legal Barriers:** Differences in national policies and legal frameworks related to data sharing, wildlife conservation, and monitoring can create barriers to harmonization and coordination of efforts at the European level.

Addressing these key gaps will require concerted efforts from stakeholders, policymakers, researchers, and conservation organizations. Establishing standardized protocols, improving data sharing mechanisms, fostering collaboration, enhancing funding support, and promoting the use of emerging technologies can contribute to the development of a more effective and harmonized wildlife population monitoring program at the European level.

It is crucial to actively **PROMOTE** and **EXPAND** initiatives and good practices that have already been developed within the ENETWILD project. These initiatives and practices represent valuable contributions to wildlife monitoring and have the potential to serve as valuable templates for harmonization and collaboration on a broader scale. By promoting and expanding these successful efforts, we can maximize their impact and further enhance wildlife monitoring efforts across Europe. On the list of already developed and tested methods and activities we can find:

- **European Observatory of Wildlife (EOW):** example of the well-designed large-scale study, which is run in the harmonized way across Europe.
- **AGOUTI:** online based tool, which is a complete solution for organizations and professionals that use camera traps to survey wildlife
- **MammalWeb:** a "citizen science" platform intended to collate, validate, and curate camera trap data that can inform us about the distribution and ecology of mammals.
- **iMammalia:** free smartphone application with a user-friendly design, which allows you to record and share sightings of mammals or their signs and tracks quickly and easily. It includes guides to identify different species and will store all your observations so you will have a detailed record of all of your mammal sightings.
- **Reports and documents** on a various topics targeting problems of standardization of monitoring in Europe available on the ENETWILD webpage: <https://enetwild.com/reports-docs/>

It is highly **RECOMMENDED** to engage multiple stakeholders, including administrations, academia, and potentially other relevant organizations, can foster collaboration, knowledge



sharing, and data integration. It is crucial to establish effective mechanisms for data sharing, coordination, and harmonization among these stakeholders to ensure the successful implementation of the ENETWILD project.

COMBINING those aspects might be crucial to sustain harmonized wildlife monitoring programmes, which will be long lasting and successful in developing long-term influence on understanding and protecting nature in Europe.

4. Final remarks

How to start up harmonized wildlife population monitoring programs, to provide basis for decision making at international level in Europe.

In this section, we present a comprehensive list of steps and objectives that are essential for making substantial advancements towards the **development of guidance on the foundational principles of European harmonized wildlife monitoring at the national and international levels** within the mid-term timeframe (five-year horizon). Notably, significant strides can be accomplished by means of proactive involvement from European administrations and countries, together with the valuable contributions of experts from the initial stages of this endeavour.

- Defining **Clear Objectives** to emphasize the need for harmonization, data standardization, and collaboration among different wildlife monitoring initiatives.
- **Identifying and engaging relevant stakeholders**, including government agencies, research institutions, conservation organizations, citizen science groups, and data providers, to solicit their input and ensure broad support for the guidance.
- **Establishing a Multidisciplinary European Working Group** comprising experts from diverse fields, including wildlife biology, ecology, epidemiology, data management, policy, and technology. This group will collaborate on the development of the guidance, but participants of this group can work as a **national contact points** during setting up initiatives in particular countries.
- **Evaluating** the current landscape of wildlife monitoring **initiatives** in Europe, identifying strengths, weaknesses, gaps, and areas for potential harmonization. This might start up the platform for sharing a knowledge and **developing or upgrading the existing IT tools** to standardize methods used among initiatives.
- **Creating standardized data collection protocols** that encompass various parameters, including target species, spatial and temporal resolutions, and data quality assurance.
- **Establishing clear guidelines for data sharing and accessibility**, promoting open data practices while ensuring data privacy and confidentiality are respected at the European level.
- **Implementing Data Management Framework** that includes data storage, organization, documentation, and quality control measures.
- **Integrating emerging technologies**, such as remote sensing, AI, and data analytics, to enhance data collection, analysis, and interpretation.
- **Encouraging collaboration and knowledge exchange** among different monitoring initiatives, facilitating the exchange of best practices and expertise.
- **Engaging with policymakers and decision-makers** to advocate for the adoption of the guidance and its integration into national and international wildlife conservation policies.
- **Publishing the guidance** disseminating it widely among relevant stakeholders, ensuring its accessibility and applicability across different regions.

5. REFERENCES

ENETWILD Consortium, Vicente, J., Soriguer Escofet, R. C., & Blanco-Aguar, J. A. (2018). Report of the 1st Annual General Meeting of ENETWILD Parma, 16-18 January 2018. *EFSA Supporting Publications*, 15(3), 1400E.

ENETWILD Consortium, Pascual R, Acevedo P, Apollonio M, Blanco-Aguar JA, Body G, Casaer J, Ferroglio E, Gomez Molina A, Illanas S, Jansen P, Keuling O, Palencia P, Plis K, Podgórski T, Ruiz Rodriguez C, Scandura M, Smith GC, Vada R, Zanet S and Vicente J (2021). Report of the 2nd Annual General Meeting of ENETWILD 5-6th October 2021. *EFSA Supporting Publications*, 18(12), 7053E.

6. ANNEX

Annex 1. List of countries and affiliations of the participants of the 3rd Annual General Meeting of ENETWILD

Organization	Country
Research Institute for nature and Forest (INBO)	Belgium
Public Service of Wallonia	Belgium
Global Biodiversity Information Facility (GBIF)	Brazil/ International
University of Forestry, Wildlife Management Department	Bulgaria
University of Zagreb	Croatia
Mendel University in Brno	Czech Republic
Czech University of Life Sciences, Prague	Czech Republic
Aarhus University, European Goose Management Platform	Denmark
Dutch National Institute of Health and the Environment	Denmark
Utrecht University / Dutch Wildlife Health Centre	Denmark
CEFE - CNRS Centre d'Ecologie Fonctionnelle et Evolutive	France
Centre de Coopération Internationale en Recherche Agronomique pour le Développement CIRAD	France
French agency of biodiversity (OFB)	France
Ilija State University (ILIAUNI)	Georgia
Friedrich-Loeffler-Institut	Germany

Max Planck Institute of Animal Behavior	Germany
University of Veterinary Medicine Hannover (TiHo)	Germany
Institute for Terrestrial and Aquatic Wildlife Research (ITAW)	Germany
Hungarian University of Agriculture and Life Sciences (MATE)	Hungary
Dept. Veterinary Sciences, University of Torino	Italy
University of Sassari	Italy
Center for Environmental Science in Saitama	Japan
State Forest Service, Republic of Latvia, Department of Hunting	Latvia
Lithuanian Research Centre for Agriculture and Forestry	Lithuania
University of Amsterdam	Netherlands
Wageningen University, Wild Ecology and Conservation group	Netherlands
FACE European Federation for Hunting Conservation	Norway / International
Mammal Research Institute, Polish Academy of Sciences	Poland
National Veterinary Research Institute, Pulawy	Poland
Department of Biology, University of Aveiro	Portugal
University of Belgrade – Faculty of Forestry	Serbia
Faculty of Environmental Protection	Slovenia
Universidad Complutense de Madrid	Spain
Araba Cazadores Gestión	Spain
Estación Biológica de Doñana CSIC	Spain
Ministry for the Ecological Transition and the Demographic Challenge	Spain
Ministry of Agriculture Fisheries and Food	Spain
National Wildlife Research Institute IREC-CSIC-UCLM	Spain
National Veterinary Institute (SVA)	Sweden
University of Gävle	Sweden
Kastamonu University	Turkey
APHA- Animal and Plant Health Agency	United Kingdom



Durham University / MammalWeb	United Kingdom
ZSL Institute of Zoology	United Kingdom
USDA- U.S. Department of Agriculture	USA

Annex 2. List of lectures given during the introductory session with links to online recordings

<i>Achievements of ENETWILD project</i>		
1	ENETWILD: overview of activities performed. organization of the AGM (workshops). Joaquín Vicente. ENETWILD-IREC	https://youtu.be/zkols9g6Qg
2	ENETWILD: population data collection activities and proposals for automatising and streamlining the process Kamila Plis. ENETWILD-MIR	https://www.youtube.com/watch?v=FS2Xk66E8W8&list=PL9WtIYKo5n43qe97yA86ZE8mIsZ6tsWr7&index=2&t=14s&pp=iAQB
3	ENETWILD: Contributions to European coordinated surveillance programmes under the One Health (OH) approach for cross-border pathogens that threatens the Union. Ezio Ferroglio ENETWILD-UNITO	https://www.youtube.com/watch?v=YCOL3uW7wws&list=PL9WtIYKo5n43qe97yA86ZE8mIsZ6tsWr7&index=3&t=1s&pp=iAQB
<i>Wildlife monitoring in Europe</i>		
4	Current situation in Europe: Wildlife monitoring responsibility and coordination. Neglected species. Oliver Keuling. ENETWILD-ITAW	https://www.youtube.com/watch?v=ezJ2R8YcRfM&list=PL9WtIYKo5n43qe97yA86ZE8mIsZ6tsWr7&index=4&pp=iAQB
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