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Report of the ENETWILD workshop: "Harmonizing wild boar monitoring in South Eastern Europe: Progress meeting of the ENETWILD consortium"

Senj, Croatia 17-18th September 2019

ENETWILD-Consortium¹, Massimo Scandura, Francesca Brivio, Stefania Zanet, Angela Fanelli, José Antonio Blanco-Aguiar, Karolina Petrovic, Ezio Ferroglio, Marco Apollonio, Nikica Šprem, Krešimir Kavčić, Nera Fabijanic, Joaquín Vicente

Abstract

The ENETWILD consortium implemented the EFSA-funded project "Wildlife: collecting and sharing data on wildlife populations, transmitting animal diseases agents", whose main objective is to collect wild boar density, hunting and occurrence data and model species geographical distribution and abundance throughout Europe. This subject is of particular concern due to the vast spread of African swine fever (ASF). In September 2019, the ENETWILD consortium organised a workshop in Croatia for 27 game biologists, animal health professionals, and experts from national hunting and forest authorities from 14 countries from South East Europe. The overall objectives of the workshop were to present milestones and achievements of the ENETWILD project, to review the framework for wild boar data collection and harmonization (hunting, density and occurrence data) of the different countries, as well as to review scientific methods for determining wild boar abundance and density, and to train on camera trapping and the random encounter method (REM). It was agreed that hunting bag data are currently the main source of information, although not always collected within a harmonized framework and rarely accompanied by a record of the hunting effort. Instead, wild boar abundance and density estimates available in South East Europe are unreliable because most of them are not based on scientific methods. Hence, there is a need to implement a novel method for determining wild boar abundance and density that uses hunting bag statistics including measures of hunting effort and efficiency during collective drive hunts, compared against density values calculated using camera trapping and the random encounter method (REM). Several collaborators have declared their willingness to participate in such pilot studies, and all agreed in improving data collection, including by means of citizen science.

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Key words: wild boar, data collection, abundance, density, hunting statistics, camera trapping, South East Europe.

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¹ www.enetwild.com

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Summary

The ENETWILD consortium (www.enetwild.com) implemented the EFSA-funded project “Wildlife: collecting and sharing data on wildlife populations, transmitting animal diseases agents”, whose main objective is to collect wildlife abundance and distribution data, that can be used by EFSA to assess the risk of spread of pathogens of potential impact on food industry and human health.

The first part of the project has been aimed at collecting boar density, hunting and occurrence data and modelling the species geographical distribution and abundance throughout Europe. This subject is of particular concern due to the spread of the African Swine Fever virus (ASFv).

After more than one year of activities of standardized data collection, the ENETWILD consortium organised a 2-day workshop to inform, engage and train representatives of the different countries (in total 21 people from 13 countries, apart from organizers, 27 in total). Participants were game biologists, animal health professionals, and experts from national hunting and forest authorities. Some of them were data providers who were supporting the project from the very beginning (since the first annual meeting in Parma, in January 2018). Others had been contacted more recently and some of them specifically during the organization of the workshop.

The event took place in Senj, Croatia, from 17th to 18th of September 2019 and was organized benefiting of the logistical support of the staff of the Faculty of Agriculture of the University of Zagreb (N. Šprem, K. Kavčić and N. Fabijanic).

The milestones and achievements of the ENETWILD project were presented, current frameworks for wild boar data collection and harmonization in South Eastern Europe reviewed, and different methods for determining wild boar abundance and density discussed, including camera trapping and the random encounter method (REM).

The workshop participants were called to present, using a standard format, the national frameworks for wild boar data collection (hunting, density and occurrence data) in their respective countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Greece, Kosovo², Moldova, Montenegro, North Macedonia, Romania, Serbia, Slovenia, Turkey). Their presentations allowed to highlight the huge variation existing among national frameworks in this part of Europe: well-organized in some countries (e.g. Slovenia) and absent or insufficient in some others. Contributors agreed that wild boar abundance and density estimates available in South Eastern Europe, where they are present, are mostly unreliable because lacking a scientific validation.

The workshop was divided into four sessions: (1) Aims and achievements of the ENETWILD project; (2) Data collection, problems and challenges in South Eastern Europe; (3) Parallel projects on data collection (FAO and MammalNet³); (4) Perspective in data collection: wild boar abundance and density estimation.

A representative of the Food and Agriculture Organization (FAO), Dr. Claudia Pittiglio, was invited to present the activities that FAO has implemented to face the spread of the ASF in Eastern Europe.

In the course of the discussions, an agreement was achieved on the need to improve data collection. Participants declare their willingness to participate in camera trapping (CT) and the random encounter method (REM) studies. It was acknowledged that a budget is critically needed to undertake such surveys. Hence, a research proposal to EFSA aiming to find funds to cover the cost of the cameras should be presented. This would help to establish a network of monitored areas where a harmonized

² This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence. This applies every time “Kosovo” is mentioned in the present document.

³ <https://www.efsa.europa.eu/en/news/mammalnet-live-download-simple-app-and-help-us-collect-data-wild-mammals-europe>

method is used to estimate wild boar density. From the workshop it became also clear that data providers must be officially recognized by the local authorities as official partners of ENETWILD consortium.

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1. Terms of Reference as provided by the requestor

This contract was awarded to the Universidad de Castilla-La Mancha by EFSA.

The project is entitled "Wildlife: collecting and sharing data on wildlife populations, transmitting animal disease agents". Specific Contract number: OC/EFSA/ALPHA/2016/01 – 01.

The workshop aimed to reinforce the network of international collaborators sharing the milestones and achievements of the ENETWILD project and understand the specificities, problems and challenges of national frameworks in South Eastern Europe for wild boar data collection. In addition, it aimed to promote the generation of new data implementing accurate protocols for determining wild boar abundance and density.

2. The ENETWILD project

The risk assessment of transmission of pathogens between wildlife, livestock, and humans requires the knowledge of the geographical distribution and abundance of wildlife species which can represent a reservoir for pathogens and disease vectors. Many European countries and organizations collect data on geographical distribution and abundance of wildlife species, but each one has its own specific characteristics with respect to the methods used, the type of data acquired, the repository implemented and their accessibility. Through the ENETWILD project (www.enetwild.com), funded by the European Food and Safety Authority (EFSA), comparable data are collected at a pan-European level to analyse the risk of spread of diseases between wildlife, livestock and humans.

This project aims to improve institutional capacity of European organisations for monitoring wildlife populations, develop standards for data collection and validation, and create and promote a common data repository. Currently, the ENETWILD project is focused on collecting density, hunting and occurrence data and modelling geographical distribution and abundance of wild boar at a pan-European level.

To encourage data sharing, the ENETWILD network has been established with the key stakeholders from government agencies, universities and research institutes across Europe. This common network of game biologists, animal health professionals, experts from national forest and hunting authorities will improve communication and collaboration between scientists and organizations, and will contribute to improve preparedness and responsiveness to the spread of ASF and better management of wild boar populations.

3. The ENETWILD workshop: "Harmonizing wild boar monitoring in South Eastern Europe: Progress meeting of the ENETWILD consortium"

Twenty-seven game biologists, animal health professionals, and experts from national forest and hunting authorities (including members of the ENETWILD consortium) met in Senj, Croatia, at the ENETWILD project workshop from 17th to 18th September 2019. The participants learnt about the milestones and achievements of the ENETWILD project, reviewed current frameworks for wild boar data collection and harmonization (hunting, density and occurrence data) in their respective countries, discussed different methods for estimating wild boar density and abundance and became familiar with camera trapping and the random encounter method (REM).

3.1. The objectives of the ENETWILD workshop

General objectives of this workshop were to present the ENETWILD project and consortium, to emphasize the need for a harmonisation of wildlife data across Europe, and to show the advances in data collection and density estimation.

The specific aims of this workshop were:

- To present the ENETWILD project milestones and achievements;
- To highlight challenges in wild boar management in Europe;
- To describe the data collection framework established by Enetwild for wild boar and to summarize the status of data collection;
- To explain the current methods for determining wild boar abundance and density;
- To explain the current methods for modelling geographical distribution and abundance of wild boar used for ASF risk assessment;
- To review data collection frameworks in the different countries of South Eastern Europe;
- To introduce the Citizen Science project for collecting wild boar distribution and abundance data;
- To discuss data collection activities, problems and challenges in South Eastern Europe with country representatives;
- To offer guidelines and assistance in data collection activities to countries with limited expertise;
- To strengthen collaboration with FAO on sharing data and contacts referred to SE Europe.

3.2. The expected outcomes

This meeting provided a better understanding for the participants in the ENETWILD project, and addressed the following points:

- Detailed and updated information on wild boar data collection in the different countries of SE Europe, from old and new contacts;
- Engagement of national representatives on the need of data harmonization across SE Europe;
- Expert input on best scientific methods for determining wild boar abundance and density;
- Expert training of participants on a protocol for determining wild boar abundance and density using camera trapping and REM.

3.3. Workshop programme

The ENETWILD workshop was held at the Libra Hotel in Senj, Croatia. After the arrival of participants, between the evening of the 17th and the morning of 18th September, the workshop started in the afternoon of the 18th September. A complete list of the participants is in Annex 1.

It was organized in four sessions: the first session focused on the presentation of the aims and achievements of the ENETWILD project; the second session focused on data collection, problems and challenges in South Eastern Europe; the third session was informative of the results of FAO activities on wild boar and introduced to the Citizen Science project, that is going to be launched by ENETWILD partners; the fourth session was dedicated to an explanation and practical demonstration of camera trapping and the random encounter method (REM).

The first session provided information on the ENETWILD project and stressed the need for population data harmonization across Europe. It was opened by representatives of IREC (project coordinator) and EFSA, who provided a brief description of project aims and milestones, showing the use of the available data for modelling wild boar abundance and distribution across Europe. ENETWILD partners (UNISS and UNITO) presented the main issues and challenges in wild boar management in Europe stressing the need of a cooperative approach. The following presentation (by regional coordinators of UNISS and UNITO) showed the updated situation with data collection in SE Europe.

The second session focused on presentation of national frameworks, problems and challenges in wild boar data collection (hunting, density and occurrence data) in Croatia, Slovenia, Serbia, Bosnia-Herzegovina, Montenegro, Kosovo, North Macedonia, Albania, Greece, Bulgaria, Romania, Moldova and Turkey. Participants followed a standardized presentation template provided by IREC, which allowed easy comparison between countries, identified key gap areas and provided understanding how data collection can be improved and harmonized across South Eastern Europe. The presentations of the participants were followed by a discussion.

The third session informed participants on two parallel initiatives. The first was represented by the FAO activities in managing the spread of African Swine Fever, which included data collection on domestic swine and wild boar populations and spatial modelling of their distribution. The second presentation concerned a new project, financed by EFSA, on the use of Citizen Science to collect data on mammal species across Europe (MammalNet⁴).

The fourth session focused on theoretical introduction, practical demonstration of camera trapping and explanation of the random encounter method (REM). It was shown how it is possible to generate new data on wild boar abundance estimates describing the different methods that are most appropriate to obtain information on the abundance/density/distribution of this species. A detailed presentation of the methods based on trap chambers was made, together with a practical demonstration in the field of capture by camera for the estimation of the density and the way to estimate and calculate the most important parameters to calculate densities based on REM.



⁴ <https://www.efsa.europa.eu/en/news/mammalnet-live-download-simple-app-and-help-us-collect-data-wild-mammals-europe>

3.3.1. Data collection, problems and challenges in South Eastern Europe

After an overview of the aims and organization of the ENETWILD project, with specific reference to the activities on wild boar, finalized to an assessment by EFSA of the risk of spread of the ASV virus across Europe, the project and regional coordinators presented the milestones achieved by the project.

Once more it was stressed the importance of monitoring wildlife species, which can be responsible of pathogen transmission to livestock and humans and the need of coordinated and harmonized data collection activities in all countries.

Regional coordinators (South East Europe) presented the state of art of data collected in South East Europe through the wild boar data model (WBDM) in use.

National representatives presented frameworks for wild boar data collection and harmonization (hunting, density and occurrence data) in their respective countries:

Albania

Absence of a national framework for hunting data collection. Several institutions (ministry, ONGs, municipalities, protected areas) are responsible for wildlife data. National hunting ban since 2014.

- Hunting: not allowed by law since 2010, no data collected;
- Density: no data collected;
- Occurrence: data collected by camera trapping in 3 regions (BioNNA database) and within the Balkan Lynx Recovery Programme (PPNEA database);

Bosnia-Herzegovina

Regional framework for Rep. Srpska and Fed. B&H, under the responsibility of the Ministry of Agriculture.

- Hunting: collected at hunting ground level, unreliable national numbers; however no data have been provided to Enetwild (no responsive contact was found);
- Density: no data collected;
- Occurrence: no data collected.

Bulgaria

National framework collating hunting and abundance data from regional levels. Ministry of Agriculture is responsible for data collection.

- Hunting: collected at a hunting ground level, hunting effort and efficiency partially collected, but only data at regional level are available in electronic format; however only data organized at national level have been provided so far to Enetwild;
- Density: no data collected;
- Occurrence: biodiversity database (Min. of Environment).

Croatia

National framework for hunting data under the responsibility of the ministry of Agriculture, but managed by the Croatian Hunting Federation (umbrella organization).

- Hunting: collected at hunting ground level (1106 hunting grounds), available as total harvest per season, hunting effort and efficiency not collected, 40-50% data are unreported;
- Density: a few data, not validated;
- Occurrence: no data collected.

Greece

Regional frameworks for hunting data collection. Data are collected by Univ. of Thessaly, hunters and environmental organizations.

- Hunting: collected at hunting ground level as total harvest per season, hunting effort and efficiency only partially collected (12 regional units). However, only hunting bag data collected under institutional framework on a yearly basis with a spatial resolution at municipality level have been provided so far to Enetwild;
- Density: a few, collected by drive hunts and camera trapping, published, can be validated;
- Occurrence: a national framework (FILOTIS database), not up to date; roadkills (by Univ. Thessaly, hunters and citizen science (PARATIRO)).

Kosovo

Obligation by law to collect data but no national framework of data collection (local and disaggregated). Ministry of Agriculture is responsible for data collection.

- Hunting: overall hunting bag per season at the country level, very low numbers (235 in total), overall effort recorded, 75-80% of data unreported;
- Density: 3 hunting areas, not validated
- Occurrence: no data collected.

Moldova

National framework for hunting data collected by the Institute of Zoology and MoldSilva.

- Hunting: collected at a hunting ground level (grouped into 32 districts), temporal frame not harmonized (season or event), available hunting effort and efficiency data but not harmonized;
- Density: collected every year and standardized throughout the country;
- Occurrence: atlas data available on grid 25x25km.

Montenegro

National framework for hunting data, collected by the Ministry of Agriculture and the Hunting Association.

- Hunting: collected at the hunting ground level per hunting day, very low numbers (763 in total in 2018/19), overall effort recorded;
- Density: no reliable data collected;
- Occurrence: no data collected.

North Macedonia

National framework for hunting data, collected at regional level and merged at central level by the Ministry of Agriculture and the Agency for Food and Veterinary.

- Hunting: collected at the hunting ground level (by law) on annual basis, recorded in statistical books, some data per hunting event, data on paper, some data on hunting effort and efficiency data;
- Density: abundance data collected for hunting plans, but not validated;
- Occurrence: no data collected.

Romania

Regional frameworks for hunting data collection but harmonized at national level. Data are collected by county authorities and merged by the ministry of Water and Forests.

- Hunting: collected at hunting ground level but available at county level, hunting effort and efficiency data partially available;
- Density: a few data are reported but not validated;
- Occurrence: roadkills recorded at regional level.

Serbia

National framework for hunting data, collected at regional level and merged at central level by the Ministry of Agriculture and the Statistical Office.

- Hunting: collected at municipality (Stat. Office) or hunting ground (Ministry) level per season, available from Stat. Office only for one every 2 years, hunting effort and efficiency data collected by hunters but not summarized by regional/national authorities; provided to Enetwild only data from Stat. Office at NUTS3 level;
- Density: scarce and not validated;
- Occurrence: no data collected.

Slovenia

National harmonized framework for hunting data collection. Data collected by hunters through online database (LISJAK), merged by Hunting Association, Forest Service and Ministry of Agriculture and processed by Slovenian Forestry Institute.

- Hunting: available at very fine (coordinates or 1x1km grid) level per season, can be extracted at event scale, hunting effort and efficiency data not collected;
- Density: no data collected;
- Occurrence: roadkills and railway-kills recorded at coordinates or 1x1km grid level.

Turkey

National framework for hunting data collection (since 2013) under the responsibility of the ministry of Agriculture.

- Hunting: collected hunting bag for sport hunting at national level, hunting effort and efficiency data not collected, large proportion of unreported illegal kills (to protect crops);
- Density: no data collected;
- Occurrence: biodiversity data collected (Noah's Ark National Biological Diversity database) and citizen science (TRAMEM project).

An open **discussion** followed these presentations.

Regional coordinators (UNISS/UNITO) presented a summary of the data reported by the different countries (Annex 3). The following general remarks were expressed:

- hunting data are in most countries the only type of collected data;
- the majority of countries have a centralized framework for hunting data collection, harmonized at national or regional level;
- the responsibility for hunting data collection is in most cases up to a ministry (often Agriculture), but hunter associations play a relevant role in several countries;
- seasonal hunting bags at hunting ground or administrative unit level are the most accessible data, hunting methods are rarely reported;
- hunting effort is quite often not collected and rarely available;
- on average >20% of kills are unreported;
- the prevalent form of wild boar hunting is by collective (drive) hunts;
- occurrence data are often not collected and rely mostly on roadkills or citizen science projects;
- density data are absent, unreliable or cannot be validated (with few exceptions).

During the discussion, several issues were debated mostly related to how to improve data collection where gaps of knowledge are present or how to convince local authorities to share available data.

The following proposals were raised:

- write a document to the local authorities in order to recognize the participants as official representatives of their countries in ENETWILD consortium
- organize training activities using camera trapping (CT) and the random encounter method (REM)
- to cover the cost of camera traps, participants in accordance with ENETWILD consortium should present a research proposal to EFSA declaring commitment to the project.
- write a scientific paper to be published on a peer review journal, related to wild boar data and management in South-eastern and Eastern Europe involving all the participants.

3.3.2. Perspectives in data collection: wild boar abundance and density estimation

- There are different methods that can be very useful for estimating wild boar densities. Camera trapping (CT) drive counts distance sampling with thermography are especially recommendable to estimate wild boar density on a local scale
- Reliable camera trapping count using the random encounter method is one of the more suitable tools to estimate wild boar densities. Can be conducted everywhere, irrespective of the habitat specificities, and at any time producing comparable data and the economic costs of the camera traps have been reduced considerably. However, it needs to maintain some assumptions (random and independent placement) and calibrate a series of parameters (day range, group size, camera setting) so that it can be spatially or temporally comparable
- Camera trapping can be used to calibrate hunting bag data densities against reliable densities for wild boar across different regions of Europe, although hunting data collection frameworks across Europe need to be harmonised to make it usable at a large scale
- A protocol is available, which was presented by ENETWILD during this workshop. Several participants, once they were trained to use it, manifested their willingness to apply it in their countries to estimate density values and to calibrate other approaches.
- Apart from density and abundance data, all Countries agreed in improving collection of occurrence data, also by means of citizen science in the context of an ENETWILD's sister project

3.4. Final conclusions of the ENETWILD workshop

This workshop provided the participants with a better understanding of the ENETWILD project and with a shared understanding of the variety of data collection frameworks in the different countries of South East Europe. Some key outcomes are the following:

- Better communication and collaboration between ENETWILD consortium and invited game biologists, animal health professionals, and experts from national forest and hunting authorities;
- The knowledge of a shared field protocol for determining wild boar abundance and density using camera trapping and the random encounter method (REM);
- Shared information to increase preparedness for and responsiveness to the spread of ASF, as well as for a better management of wild boar populations in South Eastern Europe;
- Enforcement of a network of international collaborators from South East Europe which are willing to share local contacts and information with ENETWILD and provide reliable data on wild boar abundance and distribution;
- A general interest in expanding the collaboration to other species (carnivores and ungulates) in the context of future activities that the ENETWILD consortium will carry on during 2019 and 2020, and in participating in data collection by citizen science.

Annex 1. List of participants (names and affiliations) to the ENETWILD workshop, Senj, Croatia 17-18th September 2019

ENETWILD

Joaquin Vicente Baños - Institute for Game and Wildlife Research (IREC), Ciudad Real, Spain
Massimo Scandura - Dept. Veterinary Medicine, University of Sassari, Italy
Marco Apollonio - Dept. Veterinary Medicine, University of Sassari, Italy
Ezio Ferroglio – Dept. Veterinary Sciences, University of Torino, Italy
Angela Fanelli – Dept. Veterinary Sciences, University of Torino, Italy
Karolina Petrovic - Mammal Research Institute, Polish Academy of Sciences, Poland

EFSA

Alessandro Brogna – European Food Safety Authority

FAO

Claudia Pittiglio - Animal Health, Food and Agriculture Organization (FAO)

ALBANIA

Bledi Hoxha - Protection and Preservation of Natural Environment in Albania (PPNEA)

BOSNIA-HERZEGOVINA

Dragan Kasagić - Veterinary Institute of Republic of Srpska "Dr Vaso Butozan"

BULGARIA

Daniel Denev - Animal Health & Welfare Directorate, Bulgarian Food Safety Agency

CROATIA

Nikica Sprem – Faculty of Agriculture, University of Zagreb
Krešimir Kavčić – Faculty of Agriculture, University of Zagreb
Nera Fabjanić – Faculty of Agriculture, University of Zagreb

GREECE

Alexios Giannakopoulos - Faculty of Veterinary Medicine, University of Thessaly
Kyriakos Skordas – Hunting Federation of Macedonia & Thrace

KOSOVO

Xhavit Statovci - Directorate for Management of Wildlife, Hunting, Grazing and Eco-Tourism at the Forest Agency of Kosovo
Qazim Kukulaj – Kosovo Hunters Federation

MOLDOVA

Victoria Nisteanu – Institut of Zoology, Academy of Sciences of Moldova

MONTENEGRO

Miloš Janković - Direction for Hunting, Ministry of Agriculture and Rural Development of Montenegro

NORTH MACEDONIA

Vlatko Aleksovski - Hunting Federation of Macedonia

Lidija Fajdiga - Hunting Federation of Macedonia

ROMANIA

Mihaela Spiridon - National Sanitary Veterinary and Food Safety Authority of Romania

SERBIA

Gačić Dragan - Faculty of Forestry, University of Belgrade

SLOVENIA

Boštjan Pokorny - Environmental Protection College

TURKEY

Anil Soyumert - Game and Wildlife Pr., Kastamonu University

Emrah Bozkaya - Ministry of Agriculture and Forestry



Annex 2. Program of the ENETWILD workshop, Senj, Croatia 17-18th September 2019

Tuesday 17th September 2019	
9:00–13:00	Arrival at Hotel Libra and registration of participants
13:00–14:30	Buffet lunch
14:30–14:45	Opening greetings EFSA - ENETWILD
14:45–15:15	The ENETWILD project: The need for population data harmonization across Europe. Modelling abundance/distribution data for risk assessment Vicente J
15:15–15:30	Challenges in wild boar management in Europe. Apollonio M. & Ferroglio E.
15:30–16:00	Data collection in South Eastern Europe. What do we have, what do we need? Scandura M. & Fanelli A.
16:00–16:30	Coffee break
16:30–18:30	Presentations by country representatives (each country 10-12 minutes) CROATIA - Sprem SERBIA - Gačić SLOVENIA - Pokorny MONTENEGRO - Janković NORTH MACEDONIA – Aleksovski - Fajdiga KOSOVO - Kukulaj GREECE – Giannakopoulos - Skordas
20:00	Dinner

Wednesday 18th September 2019	
9:00–10:30	Presentations by country representatives (10-12 minutes each) BOSNIA & HERZEGOVINA - Kasagić ALBANIA - Hoxha ROMANIA - Spiridon MOLDOVA - Nistreanu BULGARIA - Denev TURKEY - Bozkaya
10:30–11:00	Coffee break
11:00–13:00	Open discussion on how to boost and improve data collection in South Eastern Europe
13:00–14:30	Buffet lunch

14.30-15.00	FAO work related to African swine fever and wild boar. Pittiglio C.
15:15-15:45	How and why to invest in citizen science to improve management and knowledge of wildlife distribution? Petrović K., Fabijanac N.
15:45–19:00	<i>Training session – Wild boar abundance and density estimation</i>
15:45–16:15	Wild boar monitoring: Abundance and density estimation methods. Presentation of a proposed camera-trap method for estimation of wild boar density. Vicente J.
16:45–19:00	Field demonstration of the camera-trapping method. ENETWILD staff
19:30	Dinner

Annex 3. Summary of data collection frameworks reported by country representatives at the ENETWILD workshop, Senj, Croatia 17-18th September 2019

HUNTING DATA

	Framework	COVERAGE				HUNTED ANIMALS			EFFORT					
		Nat/Reg	% cover	Spat Res	Owner	kill/eve	kill/seas	Method	Sighted	Shot	Hunters	Beaters	Dogs	Area
Italy	Y	reg	70%	var	Reg/Hunt	depend	Y	depend	N	Y	depend	depend	depend	depend
Slovenia	Y	nat	100%	hunt.gr	Hunt/Min	Y	Y	N	depend	Y	Y	depend	depend	N
Serbia	Y	nat	100%	reg	Stat / Min	N	Y	N	N	N	N	N	N	N
Croatia	Y	nat	100%	hunt.gr	Min	N	Y	?	N	N	N	N	N	N
Fed. Bosnia-Herz														
Rep. Srpska	Y	reg	100%	hunt.gr	Min	N	Y	?	N	N	N	N	N	N
Montenegro	Y	nat	100%	hunt.gr	Hunt/Min	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kosovo	Y	loc	62%	munic	Min	N	Y	?	Y	Y	Y	N	Y	Y
N Macedonia	Y	nat	100%		Min/Vet	depend	depend	depend	Y	Y	depend	depend	depend	Y
Bulgaria	Y	nat	100%	hunt.gr	Min/Priv	Y	Y	?	depend	Y	Y	depend	N	Y
Albania	N	-	-	-	Min/Hunt	-	-	-	-	-	-	-	-	-
Greece	Y	reg	95%	hunt.gr	Acad/Hunt	depend	Y	Y	Y	Y	Y	depend	depend	Y
Romania	Y	reg	100%	Prov	Min	Y	Y	Y	Y	Y	Y	depend	depend	Y
Moldova	Y	nat	100%	hunt.gr	Acad	depend	Y	depend	Y	Y	Y	depend	depend	Y
Turkey	Y	nat	100%		Min	depend	depend	N	N	N	N	N	N	N

HUNTING DATA

OTHER DATA

	STANDARD		MISSING	METHOD			OCCURRENCE					DENSITY		
	Harmoniz	Competence	Hunted	Drive	Hide	Other	Biodiv DB	Resol	Mammal atlas	Road kills	Citizen Science	Publ	Unpubl	Valid
Italy	N	Min/Reg	20-30%	80-90%	10-15%	<5%	Y	XY	N	N	Y	scarce	scarce	N
Slovenia	Y	Min/Hunt	<1%	50%	50%	<1%	N	N	N	Y	N	N	N	N
Serbia	N	Stat / Min	20-30%	70%	30%	<1%	N		N	N	N	scarce	N	N
Croatia	Y	Min	40-50%	60-70%	30-35%	<5%	Y	depend	N	N	N	scarce	scarce	N
Fed. Bosnia-Herz														
Rep. Srpska	Y	Min	20-25%	80%	15-20%	0%	N	N	N	N	N	Y	Y	N
Montenegro	Y	Min/Hunt	7-10%	>90%	0%	7-10%	N	N	N	N	N	Y	Y	?
Kosovo	N	Min/ForAg/Hunt	?	50-60%	10-15%	20-25%	N	N	N	N	Y	N	N	N
N Macedonia	Y	Hunt Fed	5%	100%	0%	0%	N	N	N	N	N	N	Y	N
Bulgaria	Y	Min/ForAg	20-25%	80-85%	15-20%	<1%	Y	?	N	N	N	Y	?	?
Albania	-	Min/Prot/Hunt	100%	-	-	-	Y	XY	N	N	N	N	N	N
Greece	Y	Min/Hunt/Univ	15-20%	80%	20%	<1%	Y	depend	Y	Y	Y	Y	Y	Y
Romania	Y	Min	10-15%	60-70%	30-40%	<1%	?	?	?	Y	?	scarce	scarce	N
Moldova	Y	Inst Zool/Min	15-20%	80-85%	10-15%	<1%	Y	25x25km	Y	N	N	scarce	Y	Y
Turkey	N	Min	25%	25%	0%	75%	Y	XY	N	N	Y	Y	Y	N