Programme & Abstract Book

31st IUGB Congress

27>29.08.13

BRUSSELS - BELGIUM

INTERNATIONAL UNION OF GAME BIOLOGISTS

Délégation belge du CIC Wildlife
Par sympathie
www.cic-wildlife.be

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IUGB 2013

PREFACE

How can it be explained that the *International Union of Game Biologists* has remained active and successful since 1954 as a world-wide organisation of wildlife professionals, running every two year a well-attended Congress of high scientific quality in many different countries in Europe and beyond? IUGB is not a proper membership-based NGO, it has no permanent secretariat, no staff, no steady income, no regular publications, it adopts no policies or position statements and only recently it has established itself as an international non-profit NGO under Swiss law. Nevertheless IUGB operates for almost 60 years now as an effective platform or forum where those who consider themselves as "belonging to IUGB" – biologists, foresters, veterinarians, sociologists, economists, environmentalists and wildlife managers, full-time professional as well as volunteers with an active interest in conservation and sustainable management of wild species usually categorised as "game" – meet, exchange ideas, present the latest findings of their research, new technologies and tools, network and share experiences.

The reasons for this paradox became obvious to me during the preparations for the 2013 IUGB Congress in Brussels, for which we started virtually from scratch shortly after the well-organised 2011 Congress in Barcelona. It is indeed all about commitment to the cause of wildlife conservation, about enthusiasm for being actively involved in practical management of wild species and to learn and test-out new ideas and techniques. Because that is precisely why a small but efficient team of young (well, at least younger than me) wildlife professionals from the three Regions in Belgium volunteered to join the *Organising Committee* for this year's Brussels' Congress, offering active support and working hard to "deliver the goods" and meet often tight deadlines – all that most of the time in addition to their normal occupations for the bodies, agencies or institutes they are employed by. All these preparations gave me some kind of "déjà vu" feeling as Belgian IUGB *Liaison Officer* Sabine Bertouille and I were both part of the team, chaired by Professor Simon de Crombrugghe, responsible for organizing the first Brussels' IUGB Congress, back in 1985.

Anyway, I wish therefore to thank the whole *Organising Committee*, as well as all other persons and organisations having once again made it possible, through their generous advice, support, contributions (financially and in-kind) and assistance, to offer Congress participants the opportunity to enjoy three days of quality presentations in a suitable environment. And perhaps also to relax in a pleasant atmosphere for informal get-togethers and other social events, plus to find the time to see something more of Brussels and Belgium, including its wildlife.

The value of an event such as the IUGB Congress will of course be assessed on the quality of the wide range of Oral presentations and Poster presentations offered to participants as part of the official Programme. And here I want to express my recognition to the distinguished members of the *Scientific Committee* who had the challenging task of peer-reviewing almost 250 submitted abstracts and advise the *Programme Committee* on how these would best fit in the different Plenary, Parallel or Thematic sessions, covering the main topics and reflecting the overall 2013 IUGB Congress theme, namely "**Diversity in Wildlife Management** – *Objectives & Tools*".

On behalf of the *Organising Committee* I would like to wish all participants a pleasant stay in Brussels and a fruitful and interesting Congress. I am looking forward to the next editions of the IUGB Congress – first in 2015 in Mexico – and hope that their organisers will get a similar personal and professional satisfaction from that experience as we did, despite some worries about uncertain financial prospects, late registrations, last-minute changes to the programme, slightly disappointed presenters, unforeseen delays in deliveries and so on. What counts at the end is that all those who are committed to IUGB continue to meet and work together – in the interest of our wildlife and the many benefits these fascinating species bring to mankind.

Yves Lecocq, DVM
IUGB President

ABOUT IUGB

Since it was set up back in 1954 in Germany, the *International Union of Game Biologists* (IUGB) has positioned itself as a key player in Europe and abroad to promote rational wildlife conservation and management. Over the years IUGB has been operating as a flexible structure, acting as a meeting, discussion and exchange platform for biologists, foresters, veterinarians, game managers, sociologists, rural economists, hunters and others, sharing a professional or academic interest in the biology, management and sustainable use of "game" and other wild species and their habitats.

The main IUGB events are its international Congresses, organised every two years in a different country, mainly in Europe but sometimes also in North America or Africa. Previous IUGB Congresses (Hannover 2005, Uppsala 2007, Moscow 2009 and Barcelona 2011) have attracted an international audience of several hundreds of wildlife experts from all over the world, with numerous scientific presentations at plenary sessions, workshops and various side-events, the outcome of which being regularly published in separate Proceedings or in prestigious scientific journals.

ABOUT THE 2013 IUGB CONGRESS

The overall theme selected for this year's Congress is "**Diversity in Wildlife Management** – *Objectives & Tools*". All over the world, people – professionals as well as volunteers – are indeed managing wildlife species, as well as their habitats, for a wide range of reasons or stakes and using sometimes very different tools and techniques. The 2013 IUGB Congress seeks to address this diversity in order to offer participants the opportunity to learn and benefit as much as possible from each other's experiences, research results and knowledge – and this in particular thanks to a wide range of quality Oral and Poster presentations, and the views related to them.

IUGB 2013

IUGB 2013 Congress Scientific Committee

- **Dr Nicholas J. AEBISCHER**
  Deputy Director of Research, Game & Wildlife Conservation Trust, Fordingbridge, UK
- **Prof emeritus Dr Simon de CROMBRUGGHE**
  Honorary Chair, Belgium
- **Dr Stefano FOCARDI**
  ISPRA, Rome, Italy
- **Prof Dr Carlos FONSECA**
  Department of Biology, University of Aveiro, Portugal
- **Dr Jean-Michel GAILLARD**
  Director of Research, Laboratory «Biometrics & Evolutionary Biology», CNRS & University CB Lyon I, France
- **Prof Dr Klaus HACKLÄNDER**
  Institute of Wildlife Biology and Game Management, University of Natural Resources and Life Sciences (BOKU), Vienna, Austria
- **Prof emeritus Dr Thomas A. HEBERLEIN**
  Department of Community and Environmental Sociology, University of Wisconsin,USA & Department of Wildlife, Fish and Environmental Studies, Swedish University of Agricultural Sciences, Sweden
- **Dr Winifred B. KESSLER**
  President of «The Wildlife Society», Prince George, BC, Canada
- **Prof Dr Annick LINDEN**
  Chair, Wildlife Health and Pathology, Department Infectious & Parasitical Diseases, Faculty of Veterinary Medicine, University of Liège, Belgium
- **Pierre MIGOT**
  Director of Studies & Research, National Hunting and Wildlife Agency ONCFS, France
- **Prof Dr Torsten MÖRNER**
  Department for Pathology and Wildlife Diseases, National Veterinary Institute, Uppsala, Sweden
- **Prof Dr Manel PUIGCERVER**
  Dep. de Didàctica de les Ciències Experimentals i la Matemàtica, University of Barcelona, Spain
- **Prof Dr Rory PUTMAN**
  Biodiversity Research Institute, University of Glasgow, UK
- **Prof emeritus Dr Friedrich REIMOSER**
  Research Institute of Wildlife Ecology, University of Veterinary Medicine Vienna, Austria & Institute of Wildlife Biology and Game Management, University of Natural Resources and Applied Life Sciences, Vienna, Austria
- **Dr Jonathan C. REYNOLDS**
  Game & Wildlife Conservation Trust, Fordingbridge, UK
- **Prof Dr Ursula SIEBERT**
  Head of Institute, Institute for Terrestrial and Aquatic Wildlife Research, University of Veterinary Medicine Hannover, Germany
- **Prof Dr Ilse STORCH**
  Department Wildlife Ecology and Management, University of Freiburg, Germany
- **Prof Cédric VERMEULEN**
  Laboratory of Tropical Forestry, Agronomic Faculty of Gembloux, Unit GRFMN, University of Liège, Belgium

IUGB 2013 Congress Organising Committee

- **Sabine BERTOUILLE**
  IUGB Liaison Officer for Belgium
- **Jim CASAER**
  Research Institute for Nature and Forest (INBO)
- **Manuel DE TILLESSE**
  Walloon Ministry Department for Nature and Forests (DNF)
- **Yves LECOCQ**
  President IUGB
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- **Michèle LONEUX**
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  Brussels Institute for Management of the Environment (BIM/IBGE)
- **Didier VANGELUWE**
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- **Janine VAN VESSEM**
  Research Institute for Nature and Forest (INBO)

IUGB 2013 Congress Programme Committee

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  President IUGB
- **Alain LICOPPE**
  Natural and Agricultural Environmental Studies Department (DEMNA)
- **Gregory REINBOLD**
  Brussels Institute for Management of the Environment (BIM/IBGE)

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JAN VAN HAAFTEN AWARD

The ***Jan van Haaften Award for Wildlife Management in Europe*** (hereafter the "Jan van Haaften Award") is a new honour bestowed by the International Union of Game Biologists IUGB for distinguished service to applied wildlife research in Europe, contributing to the best possible management and conservation.

The international wildlife profession lost a great friend and advocate on July 10th 2012, when Professor Dr Jan L. Van Haaften died, at the age of 84 but nevertheless unexpectedly while on holiday in Slovenia. His career as a wildlife professional included research on roe deer, seals, wolf and brown bear in the Netherlands, Portugal, Slovenia, Romania and Mongolia, and contributed greatly to our understanding of the relationship between large carnivores and their prey.
As a Professor at the University of Wageningen, Netherlands, Jan imparted great enthusiasm to his students, encouraging them to think critically and always to maintain an open mind toward new ideas.

As a scientist, Jan advocated the wise and sustainable use of wildlife resources, and emphasized the importance of scientific research to improve our understanding of wild populations and their management.
Jan was an avid hunter, with a keen interest in all aspects of game biology and conservation. He was co-founder of IUGB and participated in virtually all IUGB Congresses, often accompanied by his wife Thea, who we wish to thank for having given IUGB the permission to bestow this award commemorating her husband.

The basic selection criterion for the ***Jan van Haaften Award*** is the significance and impact of an individual's contribution(s) to the field of wildlife research, undertaken in Europe and having resulted in application of management and conservation "on the ground". This person's work should be characterised by a sustained record of productivity in applied wildlife research over a substantial period of time, with a direct value for managing and conserving wild birds and/or mammals, in particular when these efforts have influenced public opinion in a constructive manner.

Recipients receive a Certificate as well as a bronze sculpture. Dutch wildlife artist Pieter Verstappen was commissioned to design and execute a suitable bronze representing a wild species of particular interest to Jan Van Haaften. The model of a roe buck is in the process of being finished and will soon be cast in bronze.

Pieter Verstappen (°1952) is a highly successful self-taught artist for over 25 years, painting realistic canvases of wildlife he observes near his home in the Dutch Province of Limburg and its Peel moorland area, as well as bronzes and lately also more impressionistic work. Pieter was selected several times to participate in the prestigious "Birds in Art" exhibitions at the Leigh Yawkey Woodson Art Museum (US).

Criteria

The nominee should have a well-established and distinguished career that has been of undoubted significance, in particular through research leading to significant improvements in wildlife management and conservation, on-the-ground management practices, or wildlife policies.

The ***Jan van Haaften Award*** is given to a living individual with an international reputation for excellence in applied wildlife research undertaken in Europe. Heads of research bodies may be eligible for the Award if they were intellectually involved in the research, i.e. contributed to the development, experimental design, analysis, and/or application of said research.

Nomination Instructions

Nomination letters should include :

1. The nominee's name, affiliation and contact details with phone numbers and e-mail address;
2. Nominee's curriculum vitae;
3. Names and contact information from at least two references;
4. A nomination statement that clearly outlines the nominee's contributions to wildlife management and applied research in Europe, covering the selection criteria listed above. The nomination statement must provide an explicit link between the nominee's career and a serious track record relative to wildlife management and research findings, recognised success, and application of results that have high importance in the field of conservation and/or wildlife management.

The Royal Belgian Institute of Natural Sciences

While the Royal Belgian Institute of Natural Sciences, together with its Museum, already has a long history behind it, its missions are constantly diversifying. This evolution is due in equal measure to the growing demands of society and to the will and creativity of the staff of the institution.
With the passage of time, the Institute has become the largest of the Belgian State scientific establishments, under the control of the departement of federal science policy.
In the course of its some 150-years' existence, it has retained the same fundamental scientific objective : to compile the inventory of all forms of life, past and present, but its scope has been steadily broadened to include the study of ecosystems and its applications for the protection of biodiversity.
Today its expertise is placed at the disposal of both public and private bodies in order to lend scientific help to their decision making and to offer innovative services in such sensitive areas as the protection of the environment.
It preserves our precious heritage, seeks to enrich it by scientific means and, above all, to enhance its potential for the public good.
It is the most important centre for the dissemination of knowledge about natural sciences in Belgium and this through permanent and temporay exhibitions, publications and events which combine interactivity, pedagogical objectives and leisure activities for the largest possible audience.
It is an active participant, even a pioneer, in issues of scientific and museological cooperation, both at the European level and on a global scale, in a field where progress would be impossible without the existence of a network of knowledge and expertise.
Finally, it contributes to the positive image of Belgium abroad.

The Museum of Natural Sciences : Humanising our relationship with nature.

Thousands of years of real or assumed civilisation have changed little that is fundamental : human beings are in nature and of nature. Anyone who studies natural sciences is looking at and into him/herself too.
A Museum of Natural Sciences creates, maintains, perfects and cultivates our link with nature. It informs the eye of the visitor and teaches him or her how to look at animals and observe nature in order to discover its countless facets. It is, admittedly, an imperfect, partial account of nature, but is also offers surprising possibilities: the visitor can glimpse extinct animals and ecosystems, as well as organisms that cannot really be seen, because they are too small, too well hidden, or too far away. It shows details and reveals processes. It sheds light on the relationships and dynamics that bring ecosystems alive and without which it would be impossible to understand global evolution. Everyone who visits the Belgian Museum of Natural Sciences does so in their own way, with their personal questions and answers, experiences and discoveries. Their power of observation become sharper, and their reasoning clearer. And their feelings become more humane.

The Royal Belgian Institute of Natural Sciences
Rue Vautier 29
B-1000 Brussels
www.naturalsciences.be

Brussels Environment

Brussels Environment **(www.bruxellesenvironnement.be)** is one of the six administrations of the Brussels-Capital Region. Its missions are to study, monitor and manage nature (green spaces and biodiversity), the air, water, soil, waste, and noise on the Region's territory, but also to issue environmental permits, monitor their observance, develop and support environmental education projects in Brussels schools, participate in meetings and negotiations at the Belgian and international level, etc. Finally, Brussels Environment has developed its activities in the area of eco-construction and the links between health and environment.

Its Forest and Nature Department manages inter alia the Brussels part of the Sonian Forest, a 4 000 ha peri-urban beech forest wherein a roe deer population (estimated to 250 animals) goes along with some newly settled wild boar.

As an administration dealing with nature in and around a 1.2 million inhabitants city, Brussels Environment expects from the event - among others - to facilitate discussions related to the management of wildlife in peri-urban areas.

Brussels Environment
Forest and Nature Department
Gulledelle 100, B-1200 Brussels, Belgium
Tel: +32 (0)2.775.77.39
Fax: +32 (0)2.775.78.04

Research Institute for Nature and Forest (INBO)

The Research Institute for Nature and Forest (INBO) is a scientific institute of the Flemish Government in Belgium. INBO represents the research and knowledge centre for biodiversity and its sustainable management and use. INBO conducts research and supplies knowledge to policy makers, managers and stakeholders.

As a leading scientific institute, INBO works for the Flemish government primarily, but also supplies information for international reporting and deals with questions from local authorities. In addition, INBO supports organisations for nature management, forestry, agriculture, hunting and fisheries. INBO is a member of national and European research networks. The institute makes its findings available to the general public.

INBO employs 215 people, mainly researchers and technicians. Besides its Brussels head office, INBO has branches in Geraardsbergen, Groenendaal and Linkebeek. The institute maintains a high standard scientific library and laboratory services.

Within the institute, the research group on wildlife management conducts research in function of sustainable use of wildlife species and the management of 'conflict' species responsible for damage or nuisance problems. The questions and problems of the different stakeholders (farmers, hunters, nature conservation and recreational users) and of the responsible authorities (regional, provincial and community level) determine the key topics of the group's research program.

Important research topics include the monitoring of annual hunting bags, ecosystem services assessment of wildlife species (game meat, recreation), human-wildlife conflicts and the potential to enhance sustainability of wildlife management and use. Other important research topics are damage-control problems, both of native and exotic species, and their possible solutions and the conservation status of the European Natura 2000 species. Apart from ecological aspects also legal, economic and social dimensions of wildlife management are gaining importance in the wildlife management research activities.

Research Institute for Nature and Forest (INBO)
Kliniekstraat 25
B-1070 Brussels
www.inbo.be

Service Public de Wallonie (SPW)

Direction générale de l'Agriculture, des Ressources naturelles et de l'Environnement
Operational Directorate-General for Agriculture, Natural Resources and the Environment (DGARNE)

http://agriculture.wallonie.be - http://environnement.wallonie.be
Avenue Prince de Liège, 15
B - 5100 NAMUR (Jambes)
Tél.: +32 (0) 81 33 51 31 - Fax : +32 (0) 81 33 51 22 - Mail : dgarne@spw.wallonie.be

The Operational Directorate-General for Agriculture, Natural Resources and the Environment (DGARNE) was born of the mid-2008 merger of two former Directorates-General, namely, the DG for Agriculture and the DG for Natural Resources and the Environment. It manages Wallonia's natural and rural heritages at the same time as it proposes avenues of development that comply with the government's Declarations in the agricultural and environmental sectors.

The DGARNE is in charge of such important policies as :

- nature conservation, environment, agriculture, waste, air, subsoil management, soil protection, and the management and use of two major natural resources: water and Wallonia's forests;
- preparation, monitoring, and implementation of the Common Agricultural Policy (CAP);
- coordination of research;
- raising awareness of the importance of sustainable development among citizens, politicians and professional decision-makers;
- ...

Inside the Directorate-Generale, two departments take mainly care of study and management of the biodiversity:

***Natural and Agricultural Environmental Studies Department* - Département de l'Etude du Milieu naturel et agricole (DEMNA)**
http://environnement.wallonie.be/eew
http://biodiversite.wallonie.be
http://agriculture.wallonie.be
Avenue Maréchal Juin, 23
B - 5030 GEMBLOUX
Tél. : +32 (0) 81 62 64 20 - Fax : +32 (0) 81 61 57 27

The Natural and Agricultural Environmental Studies Department or DEMNA draws up and co-ordinates all of the region's programmes for acquiring, validating, using, and disseminating socio-economic and environmental data in the areas of agriculture and the environment.

***Wildlife and Forestry Department* - Département de la Nature et des Forêts (DNF)**
http://environnement.wallonie.be
http://biodiversite.wallonie.be
Avenue Prince de Liège, 7
B - 5100 NAMUR (Jambes)
Tél. : +32 (0) 81 33 58 08 - Fax : +32 (0) 81 33 58 22

The Wildlife and Forestry Department is responsible for implementing the Forest Code, which includes the management of regional and municipal forests. It manages nature conservation issues (protected species, nature reserves, Natura 2000 network, etc.), as well as hunting and fishing matters.

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ACKNOWLEDGEMENTS

We thank the following organisations, companies and institutions which contributed to the success of the IUGB 2013 Congress.

SPONSORS & DONATORS

Safariclub Foundation (SCI-Foundation)
www.safariclubfoundation.org/
SCI International Foundation Headquarters :
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Tucson, Arizona 85745-9490 - USA

Niedersächsiches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz
(Lower-Saxony Ministry for Food, Agriculture, Consumer Protection & Rural Development)
www.ml.niedersachsen.de

Research Institute for Nature and Forest (Instituut voor Natuur- en Bosonderzoek)
www.inbo.be
info@inbo.be
Kliniekstraat 25
1070 Brussel

European Federation of Associations for Hunting & Conservation of the EU (FACE)
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Service Public de Wallonie (SPW)
Operational Directorate-General for Agriculture, Natural Resources and the Environment (DGARNE)
http://agriculture.wallonie.be
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IFTF
International Fur Trade Federation
www.iftf.com

Fédération National des Chasseurs (France)
www.chasseurdefrance.com/
13 rue du Général Leclerc
92136ISSY LES MOULINEAUX
contact@chasseurdefrance.com

Office National de la Chasse et de la Faune Sauvage (ONCFS)
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85 bis avenue de Wagram
75017 PARIS

Fondation François Sommer
60 rue des Archives
F-75003 Paris
www.chassenature.org

Conseil Cynégétique Hautes Fagnes – Eifel
Unter den Linden 5
B-4750 Elsenborn

Koninklijke Nederlandse Jagersvereniging (KNJV)
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FEIN
www.nibbio.org

EXHIBITORS

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Directorate B – Nature, Biodiversity and Land Use

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JohnField
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info@johnfield.eu

www.lotek.com

www.biotrack.co.uk

www.sirtrack.com

PARTNERS IN TELEMETRY

OTHER SUPPORT

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www.baxter.com
Baxter Healthcare SA
Postfach
8010 Zurich, Switzerland

Brussels Airlines is pleased to be the Preferred Carrier for the 31st IUGB Congress 2013 and extends 10% discount on available b.flex economy+, b.light & economy fares from Europe, Tel Aviv to Brussels.
www.brusselsairlines.com

Wildlife & Man vzw/asbl
www.wildlifeandman.be

Faune & biotopes
www.faune-biotopes.org
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Belgique


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Programme overview per day

IUGB 2013

■ □ □ Tuesday **27.08**

09.30 > 10.00	OPENING SESSION		
10.00 > 10.40	PLENARY SESSION 1		
	Interactions Wildlife – Wildlife		
	Keynote speaker : *Dr Wini KESSLER* **Changing wildlife-to-wildlife interactions : key issues and challenges in North America**		
10.40 > 11.00	Coffee break		
	PARALLEL SESSIONS 1 - 2 - 3		
11.00 > 12.35	PARALLEL SESSION 1 **Interactions Wildlife – Wildlife**	PARALLEL SESSION 2 **Tools for Management & Research**	PARALLEL SESSION 3 **Tools for Management & Research**
12.35 > 14.00	Lunch		
14.00 > 14.30	PLENARY SESSION 2		
	Tools for Management & Research		
	Keynote speaker : *Dr Jean-Michel GAILLARD*		
	PARALLEL SESSIONS 4 - 5 - 6		
14.35 > 16.10	PARALLEL SESSION 4 **Interactions Wildlife – Wildlife**	PARALLEL SESSION 5 **Tools for Management & Research**	PARALLEL SESSION 6 **Tools for Management & Research**
16.10 > 16.30	Coffee break		
	PARALLEL SESSIONS 7 - 8 - 9		
16.30 > 18.05	PARALLEL SESSION 7 **Tools for Management & Research**	PARALLEL SESSION 8 **Tools for Management & Research**	PARALLEL SESSION 9 **Tools for Management & Research**

Please note that this room allocation may be subject to last minute changes !

Foyers | *Room Alces* | *Room Ursus* | *Room Anser* | *Room Lynx* | *Room Perdix* | *Room Cervus* | *Room Lepus*

□ ■ □ Wednesday **28.08**

	PLENARY SESSION 3			
09.00 > 09.30	Keynote speaker : *Prof Frauke OHL* **Wildlife Welfare Management : balancing science and society**			
09.30 > 10.00	Keynote speaker : *Prof Klaus HACKLÄNDER* **The Common Agricultural Policy (CAP) and its impact on European hares**			
	PARALLEL SESSIONS 10 - 11 - 12			
10.00 > 10.45	PARALLEL SESSION 10 **Impacts Humans > Wildlife**	PARALLEL SESSION 11 **Tools for Management & Research**	PARALLEL SESSION 12 **Interactions Humans-Humans**	
10.45 > 11.00	Coffee break			
11.00 > 12.10	PARALLEL SESSION 10 [CONTINUED] **Impacts Humans > Wildlife**	PARALLEL SESSION 11 [CONTINUED] **Tools for Management & Research**	PARALLEL SESSION 12 [CONTINUED] **Interactions Humans-Humans**	
12.15 > 14.00	Lunch			
	POSTER SESSION			
14.00 > 15.30	THEMATIC SESSION **Large Carnivores**	THEMATIC SESSION **Waterbird Management**	THEMATIC WORKSHOP **Sustainable Trapping**	THEMATIC WORKSHOP **Urban Wildboar**	WORKSHOP **Wildlife Welfare**
15.30 > 16.00	Coffee break				
16.00 > 17.30	THEMATIC SESSION **Large Carnivores**	THEMATIC SESSION **Waterbird Management**	THEMATIC WORKSHOP **Sustainable Trapping**	WORKSHOP **GPS**	WORKSHOP **CAP**
19.30 > 22.30	Congress Dinner				

! Please note that participation in these Thematic Sessions and Workshops may be restricted by room capacity on a first-come, first-served basis.

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□ □ ■ Thursday **29.08**

	PLENARY SESSION 4		
09.00 > 09.30	Keynote speaker : *Prof Rory PUTMAN* **What is 'damage' and when do game-ungulates become more of a burden than a benefit ?**		
09.30 > 10.00	Keynote speaker : *Prof Thomas HEBERLEIN* **Attitudes and Wildlife Management** **Moving Beyond the Educate the Public Model**		
	PARALLEL SESSIONS 13 - 14 - 15		
10.00 > 10.45	PARALLEL SESSION 13 **Impacts** **Humans > Wildlife**	PARALLEL SESSION 14 **Interactions** **Humans-Humans**	PARALLEL SESSION 15 **Impacts** **Wildlife > Humans**
10.45 > 11.00	Coffee break		
11.00 > 12.10	PARALLEL SESSION 13 [CONTINUED] **Impacts** **Humans > Wildlife**	PARALLEL SESSION 14 [CONTINUED] **Interactions** **Humans-Humans**	PARALLEL SESSION 15 [CONTINUED] **Impacts** **Wildlife > Humans**
12.15 > 14.00	Lunch		
	PARALLEL SESSIONS 16 - 17 - 18		
14.00 > 15.35	PARALLEL SESSION 16 **Impacts** **Humans > Wildlife**	PARALLEL SESSION 17 **Interactions** **Humans-Humans**	PARALLEL SESSION 18 **Tools for Management & Research**
15.35 > 16.00	Coffee break		
16.00 > 16.45	PARALLEL SESSION 16 [CONTINUED] **Impacts** **Humans > Wildlife**	PARALLEL SESSION 17 [CONTINUED] **Interactions** **Humans-Humans**	PARALLEL SESSION 18 [CONTINUED] **Tools for Management & Research**
17.00 > 17.30	CLOSING SESSION		
	Presentation *Jan van Haaften Award* Outgoing IUGB *President Y. Lecocq* Incoming IUGB *President D. Jimenez-Garcia*		
17.30 > 19.00	LIAISON OFFICERS MEETING		

Programme details per day

■ □ □ Tuesday **27.08**

09.30 > 10.00	OPENING SESSION
10.00 > 10.40	PLENARY SESSION 1
	Interactions Wildlife – Wildlife

Keynote speaker : *Dr Wini KESSLER*
Changing wildlife-to-wildlife interactions : key issues and challenges in North America

10.40 > 11.00	Coffee break
11.00 > 12.35	PARALLEL SESSION 1
	Interactions Wildlife – Wildlife

11.00 > 11.20 **O.WW.01 - Breeding sites and migration routes of woodpigeons Columba palumbus wintering in south-west Europe**
Valérie Cohou
GIFS France, PONTONX SUR ADOUR, France

11.25 > 11.45 **O.WW.02 - Population dynamics of the European hare (Lepus europaeus) in two contrasting regions in Flanders**
Kathleen Vanhuyse, Dorien Degreef, Jonatan Wouters, Michaël Vanbriel, Johannes Mertens, Gert Michiels
Hubertus Vereniging Vlaanderen, BRUSSEL, Belgium

11.50 > 12.10 **O.WW.03 - Does predation occur on grey partridges with pathological process?**
Florian Millot[1], Emmanuel Guery[2], Anouk Decors[1], Elisabeth Bro[1]
[1]ONCFS, AUFFARGIS, France
[2]LDA18, BOURGES, France

12.15 > 12.35 **O.WW.04 - An investigation of association and fusion-fission patterns in African buffalo based on GPS telemetry**
Daniel Cornelis[1], Michel De Garine-Wichatitsky[2], Annelise Tran[3], Eve Miguel[1], Alexandre Caron[2]
[1]CIRAD, MONTPELLIER, France
[2]Cirad, RP-PCP, HARARE, Zimbabwe
[3]CIRAD UMR Tetis, MONTPELLIER, France

Please note that this room allocation may be subject to last minute changes !

Foyers | *Room Alces* | *Room Ursus* | *Room Anser* | *Room Lynx* | *Room Perdix* | *Room Cervus* | *Room Lepus*

11.00 > 12.35	PARALLEL SESSION 2
	Tools for management & research
11.00 > 11.20	**O.TL.01 - Nematode parasites introduced as tools for management of French deer wild populations** *Cécile Patrelle[1], Damien Jouet[1], Rémi Helder[2], Hubert Ferté[1]* [1]EA4688 USC Anses « Vecpar », REIMS, France [2]URCA-CERFE, BOULT-AUX-BOIS, France
11.25 > 11.45	**O.TL.02 - Preliminary study of pulmonary protostrongyliasis in hares in France : first epidemiological data** *Célia Lesage[1], Damien Jouet[1], Jean-Sébastien Guitton[2], Anouk Decors[2], Hubert Ferté[1]* [1]1EEA 4688 - USC Anses « VECPAR », REIMS, France [2]Office National de la Chasse et de la Faune Sauvage, AUFFARGIS, France
11.50 > 12.10	**O.TL.03 - Modelling the impacts of deer management practises on spatial dynamics of ticks** *Sen Li[1], Sophie Vanwambeke[1], Alain Licoppe[2], Niko Speybroeck[1]* [1]Université catholique de Louvain, LOUVAIN LA NEUVE, Belgium [2]Département de l'Etude du Milieu Naturel et Agricole - SPW, GEMBLOUX, Belgium
12.15 > 12.35	**O.TL.04 - Spread of tuberculosis in alpine wildlife populations in Bavaria** *Andreas Koenig[1], Matthias Büttner[2], Janko Christof[1], Matthias Müller[2], Janina Domogalla[2]* [1]Technische Universität München, FREISING, Germany [2]Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit, OBERSCHLEISSHEIM, Germany

11.00 > 12.35	PARALLEL SESSION 3
	Tools for management & research
11.00 > 11.20	**O.TL.05 - Methodology used for the European badger (Meles meles) monitoring in Wallonia** *Vinciane Schockert, Clotilde Lambinet, Yves Cornet, Roland Libois* ULg, LIEGE, Belgium
11.25 > 11.45	**O.TL.06 - Does red deer management unit area suit for wild boar in Southern Belgium ?** *Céline Prévot, Alain Licoppe* Département de l'Etude du Milieu Naturel et Agricole - SPW, MARCHE-EN-FAMENNE, Belgium
11.50 > 12.10	**O.TL.07 - Mapping and analysis of wild boar (Sus scrofa) rooting sites in grassland** *Marlies Volckaert[1], Kris Verheyen[1], Jim Casaer[2], Thomas Scheppers[2]* [1]University of Ghent, GENT, Belgium [2]INBO, GERAARDSBERGEN, Belgium

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12.15 > 12.35	**O.TL.08 - Totfund-Kataster Schleswig-Holstein - A System for Surveying Dead Vertebrates in Landscapes** *Daniel Hoffmann, Heiko Schmüser* Christian-Albrechts-Universität Kiel, WADERN, Germany
12.35 > 14.00	Lunch
14.00 > 14.30	PLENARY SESSION 2
	Tools for management & research
	Keynote speaker : *Dr Jean-Michel GAILLARD*
14.35 > 16.10	PARALLEL SESSION 4
	Interactions Wildlife – Wildlife
14.35 > 14.55	**O.WW.05 - Linking animal movement and reproduction through tracking data** *Navinder Singh* Swedish University of Agricultural Sciences, UMEA, Sweden
15.00 > 15.20	**O.WW.06 - Eurasian lynx hunting red deer: is there an influence of winter enclosure system?** *Elisa Belotti[1], Dušan Romportl[2], Jakub Kreisinger[2], Marco Heurich[3], Ludek Bufka[1]* [1]Czech University of Life Sciences in Prague, PRAGUE, Czech Republic [2]Faculty of Science, Charles University in Prague, PRAGUE, Czech Republic [3]Dpt. of Research and Documentation, Bavarian Forest National Park, GRAFENAU, Germany
15.25 > 15.45	**O.WW.07 - Top predators, mesopredators and their prey : the importance of ecosystem context in species interactions** *Bodil Elmhagen, Euan Ritchie, Alistair Glen, Pekka Helle, Mike Letnic, Gilbert Ludwig, Robbie McDonald, Steven Rushton, Harto Lindén* Stockholm University, STOCKHOLM, Sweden
15.50 > 16.10	**O.WW.08 - Mesopredator abundance in presence and absence of large predators - a continental approach** *Marianne Pasanen-Mortensen, Bodil Elmhagen, Markku Pyykonen* Stockholm University, STOCKHOLM, Sweden

14.35 > 16.10	PARALLEL SESSION 5
	Tools for management & research

14.35 > 14.55 **O.TL.09 - Landscape genetics : A motorway is a barrier for red deer, but not wild boars**

Alain Frantz[1], Sabine Bertouille[2], Alain Licoppe[2], Marie-Christine Flamand[3]
[1]Musée National d'Histoire Naturelle, LUXEMBOURG, Luxembourg
[2]Département de l'Etude du Milieu Naturel et Agricole - SPW, GEMBLOUX, Belgium
[3]University of Louvain, LOUVAIN-LA-NEUVE, Belgium

15.00 > 15.20 **O.TL.10 - Potential contributions of landscape genetic research to spatially-explicit game management**

Niko Balkenhol
Georg-August University of Göttingen, GÖTTINGEN, Germany

15.25 > 15.45 **O.TL.11 - Genetic analyzes of red deer: applications in management and forensic methods**

Marie-Christine Flamand[1], Sabine Bertouille[2], M.C. Eloy[1], F. Chaumont[1], Alain Licoppe[2], Alain Frantz[3]
[1]Université Catholique de Louvain - Institut des Sciences de la Vie, LOUVAIN-LA-NEUVE, Belgium
[2]Département de l'Etude du Milieu Naturel et Agricole - SPW, GEMBLOUX, Belgium
[3]Musée National d'Histoire Naturelle, LUXEMBOURG, Luxembourg

15.50 > 16.10 **O.TL.12 - Population structure of wild boars in Slovenia as inferred by microsatellites**

Nevena Velickovic[1], Mihajla Djan[1], Eduardo Ferreira[2], Matija Stergar[3], Milos Beukovic[4], Dragana Obreht[1], Carlos Fonseca[2]
[1]Faculty of Sciences, University of Novi Sad, NOVI SAD, Serbia
[2]Department of Biology, University of Aveiro, AVEIRO, Portugal
[3]Biotehnical Faculty, Department of Forestry,University of Ljubljana, LJUBLJANA, Slovenia
[4]Faculty of Agriculture, University of Novi Sad, NOVI SAD, Serbia

14.35 > 16.10	PARALLEL SESSION 6
	Tools for management & research

14.35 > 14.55 **O.TL.13 - Monitoring of waterbirds for Mediterranean wetlands conservation**

Anne-Laure Brochet[1], Hichem Azafzaf[2], Szablocs Nagy[3], Jean-Yves Mondain-Moval[4], Thomas Galewski[1], Michel Gauthier-Clerc[1]
[1]Centre de Recherche de la Tour du Valat, ARLES, France
[2]Association „les Amis des Oiseaux„, ARIANA, Tunisia
[3]Wetlands International, WAGENINGEN, The Netherlands
[4]Office National de la Chasse et de la Faune Sauvage, ARLES, France

15.00 > 15.20 **O.TL.14 - Habitat use by radio-marked greylag geese (Anser anser) in Bavaria/Germany**

Anke Kleinhenz, Christof Janko, Andreas Koenig
Technische Universität München, Wildlife Biology and Management Unit, FREISING, Germany

15.25 > 15.45 **O.TL.15 - Hunting for the optimal hunt**

Gitte Høj Jensen[1], Jesper Madsen[1], Mary Wisz[1], Ingunn Tombre[2]
[1]Aarhus University, ROSKILDE, Denmark
[2]Norwegian Institute for Nature Research, TROMSØ, Norway

15.50 > 16.10 **O.TL.16 - Integrated management of invasive geese populations in an international context : a case study**

Tim Adriaens[1], Paul Van Daele[1], Sander Devisscher[1], Frank Huysentruyt[1], Berend Voslamber[2], Vincent De Boer[2], Koen Devos[1], Jim Casaer[1]
[1]Research Institute for Nature and Forest (INBO), BRUSSELS, Belgium
[2]SOVON Vogelonderzoek, NIJMEGEN, The Netherlands

16.10 > 16.30 Coffee break

16.30 > 18.05 PARALLEL SESSION 7

Tools for management & research

16.30 > 16.50 **O.TL.17 - Population history and connectivity in a northwards expanding carnivore : the Fennoscandian red fox**

Karin Norén[1], Erik Ågren[2], Marja Isomursu[3], Oystein Flagstad[4], Mark Statham[5], Ben N. Sacks[5]
[1]Stockholm University, STOCKHOLM, Sweden
[2]National Veterinary Institute, UPPSALA, Sweden
[3]Fish and Wildlife Health Research Unit, OULU, Finland
[4]Norwegian Institute for Nature Research, TRONDHEIM, Norway
[5]Center for Veterinary Genetics, UC Davis, DAVIS, CA, United States of America

16.55 > 17.15 **O.TL.18 - Biotic homogenization and hybridization of the red-legged partridge : effects of game management in England**

Filippo Barbanera[1], Giovanni Forcina[1], Alessia Cappello[1], Monica Guerrini[1], Nicholas Aebischer[2]
[1]Dipartimento di Biologia, Università di Pisa, PISA, Italy
[2]Game & Wildlife Conservation Trust, FORDINGBRIDGE, United Kingdom

17.20 > 17.40 **O.TL.19 - Ancient and modern DNA for adaptive conservation management of the black francolin (Francolinus francolinus)**

Giovanni Forcina[1], Panicos Panayides[2], Hein Van Grouw[3], Monica Guerrini[1], Omar Fadhil Al-Sheikhly[4], Jamshid Mansoori[5], Muahmmad Naeem Awan[6], Aleem Ahmed Khan[7], Pantelis Hadjigerou[2], Filippo Barbanera[1]
[1]Dipartimento di Biologia, Università di Pisa, Italia, PISA (PI), Italy
[2]Game and Fauna Service, Ministry of Interior, NICOSIA, Cyprus
[3]Bird Group, Department of Life Sciences, The Natural History Museum, TRING, United Kingdom

[4]Department of Biology, University of Baghdad,, BAGHDAD, Iraq
[5]Department of the Environment, Azad Islamic University, Tonekabon Branch, TONEKABON, Iran
[6]Program for Mountain Areas Conservation, Ministry of Environment, MUZAFFARABAD, Pakistan
[7]Institute of Pure and Applied Biology, Bahauddin Zakariya University, MULTAN, Pakistan

17.45 > 18.05 **O.TL.20 - Sexual dimorphism of home range size in Red Deer (Cervus elaphus) - does it exist ?**

Hendrik Edelhoff, Johannes Signer, Horst Reinecke, Marcus Meissner, Niko Balkenhol, Sven Herzog
University of Göttingen, GÖTTINGEN, Germany

16.30 > 18.05 PARALLEL SESSION 8

Tools for management & research

16.30 > 16.50 **O.TL.21 - Spotlight vs. faeces-genotyping : Evaluation of detection-rates**

Ulf Hettich[1], Ulf Hohmann[1], Cornelia Ebert[2], R.-R. Marell[2], Moritz Rahlfs[1], Julian Sandrini[1], Bettina Spielberger[2], Bernhard Thiele[2]
[1]Research Institute for Forest Ecology and Forestry Rhineland-Palatinate, Trippstadt, Germany
[2]Seq-IT, KAISERSLAUTERN, Germany

16.55 > 17.15 **O.TL.22 - Can faecal DNA and capture-recapture modelling yield good population size estimates for wild boar ?**

Cornelia Ebert[1], Julian Sandrini[2], Ulf Hohmann[2], Bernhard Thiele[1]
[1]Seq-IT, KAISERSLAUTERN, Germany
[2]Research Institute for Forest Ecology and Forestry Rhineland-Palatinate, TRIPPSTADT, Germany

17.20 > 17.40 **O.TL.23 - Wild Boar population size estimated by hunting bag genotyping**

Björn Müller, Jörg Brün
University of Bonn, BONN, Germany

17.45 > 18.05 **O.TL.24 - Detection of antibodies against Schmallenberg virus in wild boar, Belgium, 2010-2012**

Daniel Desmecht[1], Mutien-Marie Garigliany[1], Martin Beer[2], Horst Schirrmeier[2], Julien Paternostre[1], Rosario Volpe[1], Annick Linden[1]
[1]University of Liège, LIÈGE, Belgium
[2]Friedrich-Loeffler Institut, GREIFSWALD-INSEL RIEMS, Germany

16.30 > 18.05	PARALLEL SESSION 9
	Tools for management & research
16.30 > 16.50	**O.TL.25 - Reproducible Home Ranges : a new R package for analyzing wildlife telemetry data** *Johannes Signer, Niko Balkenhol* Georg August University Göttingen, GÖTTINGEN, Germany
16.55 > 17.15	**O.TL.26 - The use of temperature sensors in wildlife research** *Anne Berger* Leibniz Institute for Zoo and Wildlife Research, BERLIN, Germany
17.20 > 17.40	**O.TL.27 - Knowing what animals do - linking acceleration data and deer behavior** *Max Kroeschel* University of Freiburg, FREIBURG, Germany
17.45 > 18.05	**O.TL.38 - Monitoring under uncertainty for informed management decisions about poaching in the Serengeti** *Ana Nuno[1], Nils Bunnefeld[2], EJ Milner-Gulland[1]* [1]Imperial College London, ASCOT, United Kingdom [2]Stirling University, STIRLING, United Kingdom

□ ■ □ Wednesday **28.08**

09.00 > 10.00	PLENARY SESSION 3
09.00 > 09.30	Keynote speaker : *Prof Frauke OHL* **Wildlife Welfare Management : balancing science and society**
09.30 > 10.00	Keynote speaker : *Prof Klaus HACKLÄNDER* **The Common Agricultural Policy (CAP) and its impact on European hares**

10.00 > 10.45	PARALLEL SESSION 10
	Impacts Humans > Wildlife
10.00> 10.20	**O.HW.01 - Translocation as a mountain caribou management tool : population plasticity, the landscape and lesson learned** *Dennis Jelinski[1], Heather Leech[1], Gerald Kuzyk[2], Leo DeGroot[2], Kristen Kilistoff[1], Mark Williams[2]* [1]University of Victoria, VICTORIA, Canada [2]Ministry of Forests, Lands and Natural Resource Operations, VICTORIA, Canada
10.25 > 10.45	**O.HW.02 - Cross country skiing and red deer (Cervus elaphus Linné), in the Eifel National Park** *Michael Petrak* Forschungsstelle für Jagdkunde, BONN, Germany

10.00 > 10.45	PARALLEL SESSION 11
	Tools for management and research
10.00 > 10.20	**O.TL.29 - Gamebird releasing in UK based on 50 years of the GWCT National Gamebag Census** *Nicholas Aebischer* Game & Wildlife Conservation Trust, FORDINGBRIDGE, United Kingdom
10.25 > 10.45	**O.TL.30 - Regulatory mechanisms of hunting pressure in red-legged partridge : how to optimize decision-making** *Jesús Caro, Miguel Delibes-Mateos, Javier Viñuela, Juan F. López-Lucero, Beatriz Arroyo* Instituto de Investigación en Recursos Cinegéticos (IREC; CSIC-UCLM-JCCM), CIUDAD REAL, Spain

Please note that this room allocation may be subject to last minute changes !

Foyers | *Room Alces* | *Room Ursus* | *Room Anser* | *Room Lynx* | *Room Perdix* | *Room Cervus* | *Room Lepus*

10.00 > 10.45	PARALLEL SESSION 12
	Interactions Humans-Humans
10.00 > 10.20	**O.HH.01 - 'Human dimension' in wild boar management** *Oliver Keuling* University of Veterinary Medicine Hannover, HANNOVER, Germany
10.25 > 10.45	**O.HH.02 - A bottom-up approach for defining criteria, indicators and impacts for wild boar management** *Jim Casaer[1], Thomas Scheppers[1], Hans Keune[2], Francis Trukelboom[2]* [1]Research Institute for Nature and Forest, GERAARDSBERGEN, Belgium [2]Research Institute for Nature and Forest, BRUSSELS, Belgium
10.45 > 11.00	Coffee break
11.00 > 12.10	PARALLEL SESSION 10
	Impacts Humans > Wildlife [continued]
11.00 > 11.20	**O.HW.03 - Adaptive behavior of GPS-collared moose against thermal stress detected with airborne laser scanning** *Markus Melin[1], Petteri Packalén[1], Juho Matala[2], Lauri Mehtätalo[1], Raisa Tiilikainen[3], Olli-Pekka Tikkanen[1], Jyrki Pusenius[3], Matti Maltamo[1]* [1]University of Eastern Finland, JOENSUU, Finland [2]Finnish Forest Research Institute, JOENSUU, Finland [3]Finnish Game and Fisheries Research Institute, JOENSUU, Finland
11.25 > 11.45	**O.HW.04 - Effects of harvest, culture, and climate on size of horn-like structures in trophy ungulates** *Paul Krausman[1], Kevin Monteith[2], Ryan Long[3], Vernon Bleich[4], James Heffelfinger[5], R. Terry Bowyer[3]* [1]University of Montana, MISSOULA, MONTANA, United States of America [2]University of Wyoming, LARAMIE, United States of America [3]Idaho State University, POCATELLO, IDAHO, United States of America [4]California Department of Fish and Game, BISHOP, CALIFORNIA, United States of America [5]Arizona Game and Fish Department, TUCSON, United States of America
11.50 > 12.10	**O.HW.05 - Moose in the transboundary forests and the role of ecological corridors** *Olgirda Belova* Institute of Forestry LRCAF, GIRIONYS KAUNAS DISTRICT, Lithuania

11.00 > 12.10	PARALLEL SESSION 11
	Tools for management and research [continued]

11.00 > 11.20 **O.TL.31 - Zonation - A multi-approach tool for conservation planning, the capercaillie as the focal species**

Harto Lindén[1], Saija Sirkiä[2], Joona Lehtomäki[3], Erkki Tomppo[4], Atte Moilanen[3]
[1]Finnish Game and Fisheries Research Institute, HELSINKI, Finland
[2]Finnish Environment Institute, HELSINKI, Finland
[3]Department of Biosciences, University of Helsinki, HELSINKI, Finland
[4]Finnish Forest Research Institute, Vantaa Research Unit, VANTAA, Finland

11.25 > 11.45 **O.TL.32 - Modeling both individuals distribution and sampling processes : a powerful tool to define monitoring programs**

Hugues Santin-janin[1], Jean-Sébastien Guitton[1], Stéphane Marchandeau[1], Franck Drouyer[2], Yves Léonard[1], Jérome Letty[1]
[1]French Game and Wildlife Agency, AUFFARGIS, France
[2]Hunting federation, SAINT-SYMPHORIEN, France

11.50 > 12.10 **O.TL.33 - Talking to wild boars - an acoustic device to prevent wild boar damage in farmland**

Stefan M. Suter
Zurich University of Applied Sciences ZHAW, WÄDENSWIL, Switzerland

11.00 > 12.10	PARALLEL SESSION 12
	Interactions Humans-Humans (continued)

11.00 > 11.20 **O.HH.03 - Hunters' and farmers' attitudes to the management of the wild boar in Sweden**

Fredrik Widemo[1], Göran Ericsson[2], Jonas Kindberg[2]
[1]Uppsala University, UPPSALA, Sweden
[2]Swedish University of Agricultural Sciences, UMEÅ, Sweden

11.25 > 11.45 **O.HH.04 - An integrated approach to wild pig (Sus scrofa) management**

Jessica Tegt, Bronson Strickland, William Hamrick
Mississippi State University, MS STATE, United States of America

11.50 > 12.10 **O.HH.05 - The attempt to use the driving sense method for large-scale inventory of red deer (Cervus elaphus L.) and wild boar (Sus scrofa L.)**

Maciej Skorupski[1], Grzegorz Górecki[1], Mikolaj Jakubowski[1], Robert Kamieniarz[1], Tadeusz Kubacki[2], Magdalena Misiorowska[3], Pawel Nasiadka[3], Henryk Okarma[4], Marek Pudelko[5], Jacek Skubis[1], Andrzej Tomek[2], Marek Wajdzik[2]
[1]Poznan University of Life Sciences, POZNAN, Poland
[2]University of Agriculture in Krakow, KRAKÓW, Poland
[3]Warsaw University of Life Sciences, WARSAW, Poland
[4]Institute of Nature Protection Polish Academy of Science, KRAKÓW, Poland
[5]Forest Research Institute, SEKOCIN STARY, Poland

12.15 > 14.00	Lunch
	POSTER SESSION

! Please note that participation in these Thematic Sessions and Workshops may be restricted by room capacity on a first-come, first-served basis.

14.00 > 17.30	THEMATIC SESSION
	Large Carnivores

Introductory presentation - Hunter vs predator : exploring the complex relationships between hunters and large carnivores

John Linnell
Norwegian Institute for Nature Research, TRONDHEIM, Norway

O.LC.01 - Actions on large carnivores at the level of the European Union

András Demeter
European Commission, BRUSSELS, Belgium

O.LC.02 - Challenges to predicting ungulate population dynamics in three wolf-ungulate systems

Mark Hebblewhite[1], John Vucetich[2], Doug Smith[3], Rolf Peterson[2]
[1]University of Montana, MISSOULA, MONTANA, United States of America
[2]School of Forest Resources Environmental Science, Michigan Tech University, HOUGHTON, MICHIGAN, United States of America
[3]Yellowstone Center for Resources, Wolf Project, YELLOWSTONE NATIONAL PARK, WYOMING, United States of America

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O.LC.03 - Realized habitat selection and space use by brown bears reintroduced to the Italian Alps

Wibke Peters[1], Maria Cavedon[2], Andrea Mustoni[2], Claudio Groff[3], Ruggero Giovannini[3], Francesca Cagnacci[4]
[1]Fondazione Edmund Mach, Italy & The University of Montana, USA, SAN MICHELE ALL'ADIGE, Italy
[2]Parco Naturale Adamello Brenta - Adamello Brenta Nature Park, STREMBO, Italy
[3]Provincia Autonoma di Trento, TRENTO, Italy
[4]Fondazione Edmund Mach, SAN MICHELE ALL'ADIGE, Italy

O.LC.04 - Improving the study design of Eurasian lynx (Lynx lynx) monitoring from camera trap data

Kirsten Weingarth[1], Thorsten Zeppenfeld[1], Christoph Heibl[1], Ludek Bufka[2], Kristina Daniszová[2], Marco Heurich[1], Jörg Müller[1]
[1]Bavarian Forest National Park, GRAFENAU, Germany
[2]Šumava National Park Administration, VIMPERK, Czech Republic

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O.LC.05 - Testing the risk of predation hypothesis : do moose change their habitat selection in response to recolonizing wolves?

Kerry L. Nicholson[1], Cyril Milleret[1], Cyril Milleret[2], Johan Mansson[1], Hakan Sand[1]
[1]Grimsö Wildlife Research Station, Swedish University of Agricultural Sciences, RIDDARHYTTAN, Sweden
[2]Hedmark University College, Faculty of Forestry and Wildlife Management, KOPPANG, Norway

O.LC.06 - Attitudes toward large carnivores and acceptance of illegal hunting on the Scandinavian Peninsula

Kristin E. Gangaas[1], Harry P. Andreassen[1], Bjørn Petter Kaltenborn[2]
[1]Hedmark University College, KOPPANG, Norway
[2]Norwegian Institute of Nature Research, LILLEHAMMER, Norway

O.LC.07 - Exploitation of large carnivore damage prevention measures in Estonia : guidelines for coexistence with humans

Teet Otstavel[1], Tonu Talvi[2], Hannu Saloniemi[1]
[1]University of Helsinki, PARAINEN, Finland
[2]Environmental Board, Nature Conservation Department, SAAREMAA, Estonia

O.LC.08 - Diet of wolves and selection of wild ungulates in an area of Northern Italy

Alberto Meriggi, Valentina Dagradi, Pietro Milanesi, Marco Lombardini, Serena Raviglione, Ambra Repossi
University of Pavia, PAVIA, Italy

14.00 > 17.30 THEMATIC SESSION

Waterbird Management

Introductory presentation - Harvest management of waterbirds - reconstituting the Waterbird Harvest Specialist Group

Jesper Madsen
Aarhus University, AARHUS, Denmark

O.WB.01 - Stakeholder perspectives when setting waterbird population targets : Implications for flyway management within Europe

James Williams, Jesper Madsen
Aarhus University, AARHUS, Denmark

O.WB.02 - Geese spring staging areas in Central European part of Russia : conditions and conservation problems

Peter Glazov, Grigori Tertitski, Alexander Dmitriev
Institute of geography RAS, MOSCOW, Russian Federation

O.WB.03 - Lead shot ingestion in birds in Russia

Alexey Sergeyev
Russian Game Management and Fur Farming Research Institute named by Professor B., KIROV, Russian Federation

O.WB.04 - Illegal shooting of migratory swans and an initiative to address the issue

Julia Newth[1], Martin Brown[1], Eileen Rees[1], Baz Hughes[1], Cy Griffin[2], Angus Middleton[2]
[1]Wildfowl & Wetlands Trust, GLOUCESTER, United Kingdom
[2]Federation of Associations for Hunting and Conservation of the European Union, BRUSSELS, Belgium

O.WB.05 - Learning and adaptation in the management of waterfowl harvests

Fred A. Johnson
Southeast Ecological Science Center, U.S. Geological Survey, GAINESVILLE, United States of America

14.00 > 17.30 THEMATIC WORKSHOP

Sustainable Trapping

O.TR.01 - Trapping in light of a proposed ban

Per E Ljung[1], Fredrik Widemo[2], Göran Ericsson[1], Anders Kagervall[1], Fredrik Widemo[3]
[1]Swedish University of Agricultural Sciences, UMEÅ, Sweden
[2]The Swedish Association for Hunting and Wildlife Management, NYKÖPING, Sweden
[3]Uppsala University, UPPSALA, Sweden

O.TR.02 - Comparison of traditional jaw type killing traps and modern cable restraints to capture foxes

Péter Pál Hajas
University of West Hungary Institute of Wildlife Management, SOPRON, Hungary

14.00 > 15.30 THEMATIC WORKSHOP

Urban Wildboar

O.WSU.01 - Probing wild boar population trends under adaptive management in Collserola Natural Park, Barcelona

Seán Cahill, Francesc Llimona, Lluís Cabañeros, Francesc Calomardo
Consorci del Parc Natural de la Serra de Collserola, BARCELONA, Spain

14.00 > 15.30 WORKSHOP

The duty of care for animals: How relevant is the context of use

Chairs : *Frauke Ohl & Rory Putman*

15.30 > 16.00 Coffee break

16.00 > 17.30 WORKSHOP

GPS

CAP

□ □ ■ Thursday **29.08**

09.00 > 10.00	PLENARY SESSION 4
09.00 > 09.30	Keynote speaker : *Prof Rory PUTMAN* **What is 'damage' and when do game-ungulates become more of a burden than a benefit ?**
09.30 > 10.00	Keynote speaker : *Prof Thomas HEBERLEIN* **Attitudes and wildlife management — Moving beyond the educate the public model**

10.00 > 10.45	PARALLEL SESSION 13
	Impacts Humans > Wildlife
10.00 >10.20	**O.HW.06 - Evaluation of the hybridization between the domestic cat and the European wildcat in the Walloon region** *Clotilde Lambinet, Vinciane Schockert, Roland Libois* Université de Liège, LIÈGE, Belgium
10.25 > 10.45	**O.HW.07 - Hybrid quails restocking practices: a real threat for native common quail populations** *Manel Puigcerver[1], Inés Sanchez-Donoso[1], Carles Vilà[2], Francesc Sardà-Palomera[3], Eduardo García-Galea[1], José Domingo Rodríguez-Teijeiro[1]* [1]Universitat de Barcelona, BARCELONA, Spain [2]Estación Biológica de Doñana (EBD-CSIC), SEVILLA, Spain [3]Institut Català d'Ornitologia, BARCELONA, Spain

10.00 > 10.45	PARALLEL SESSION 14
	Interactions Humans-Humans
10.00 > 10.20	**O.HH.06 - The views of hunters on the release of farm-reared red-legged partridges in Spain** *Miguel Delibes-Mateos[1], Jesús Caro[1], Javier Viñuela[1], Pere Riera[2], Silvia Fernández-Díaz[1], Beatriz Arroyo[1]* [1]Instituto de Investigación en Recursos Cinegéticos (IREC; CSIC-UCLM-JCCM), CIUDAD REAL, Spain [2]Autonomous University of Barcelona, BARCELONA, Spain
10.25 > 10.45	**O.HH.07 - Game species as motivation for voluntary conservation and biodiversity-oriented management of forests** *Saija Sirkiä[1], Paula Horne[2], Teppo Hujala[3], Marko Svensberg[4]* [1]Finnish Environment Institute, HELSINKI, Finland [2]Pellervo Economic Research PTT, HELSINKI, Finland [3]Finnish Forest Research Institute (Metla), VANTAA, Finland [4]Finnish Wildlife Agency, HELSINKI, Finland

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10.00 > 10.45	PARALLEL SESSION 15
	Impacts Wildlife > Humans
10.00 > 10.20	**O.WH.01 - Demographic structure and body condition of hunted and by-caught Baltic grey seals** *Kaarina Kauhala[1], Mervi Kunnasranta[2]* [1]Finnish Game and Fisheries Research Institute, TURKU, Finland [2]University of Eastern Finland, JOENSUU, Finland
10.25 > 10.45	**O.WH.02 - Using drones to count the elephants** *Julie Linchant[1], Cédric Vermeulen[1], Jonathan Lisein[1], Prosper Sawadogo[2], Philippe Bouché[3], Philippe Lejeune[1]* [1]Gembloux Agro-Bio Tech (ULg), GEMBLOUX, Belgium [2]OFINAP, Office National des Aires Protégées, OUAGADOUGOU, Burkina-Faso [3]Programme d'Appui aux Parcs de l'Entente (PAPE), UNDP, OUAGADOUGOU, Burkina-Faso
10.45 > 11.00	Coffee break
11.00 > 12.10	PARALLEL SESSION 13
	Impacts Humans > Wildlife [continued]
11.00 > 11.20	**O.HW.08 - Is home range size a function of forest fragmentation ?** *Michael Berchtold, Luca Rotelli, Ilse Storch* Universität Freiburg, FREIBURG, Germany
11.25 > 11.45	**O.HW.09 - Road accessibility may reduce effective stopover N2000 habitat area for migratory birds in Greece** *Ronny Merken, Joachim Teunen, Nico Koedam* Vrije Universiteit Brussel, BRUSSELS, Belgium
11.50 > 12.10	**O.HW.10 - Global change effects on badger (Taxidea taxus) distribution in Mexico** *Daniel Jiménez García[1], Javier Cordero Valeriano[1], Luis Jiménez García[2], Agustín Aragón García[1], Dionicio Juárez Ramón[1]* [1]CENAGRO-ICUAP, PUEBLA, Mexico [2]Maestría en Manejo Sostenible de Agroecosistemas-ICUAP, PUEBLA, PUEBLA., Mexico
11.00 > 12.10	PARALLEL SESSION 14
	Interactions Humans-Humans [continued]
11.00 > 11.20	**O.HH.08 - Regional economic effects of visitors in state owned recreational areas in Finland** *Mikko Rautiainen, Liisa Kajala* Metsähallitus, VAASA, Finland

11.25 > 11.45 **O.HH.09 - National economy's impact on hunting demand : evidence from Greece**

Kyriakos Skordas[1], Konstantinos Papaspyropoulos[2]
[1]Hunting Federation of Macedonia and Thrace, THESSALONIKI, Greece
[2]Laboratory of Forest Economics, Faculty of Forestry and Natural Environment, Ari, THESSALONIKI, Greece

11.50 > 12.10 **O.HH.10 - Hunting and habitat conservation : evidence from the Republic of Ireland**

David Scallan
National Association of Regional Game Councils, GALWAY, Ireland

11.00 > 12.10 PARALLEL SESSION 15

Impacts Wildlife > Humans [continued]

11.00 > 11.20 **O.WH.03 - Do we have a wild boar problem? A cost-benefit analysis**

Ulf Hohmann
Research Institute for Forest Ecology and Forestry, TRIPPSTADT, Germany

11.25 > 11.45 **O.WH.04 - Habitat use of wild boar (Sus scrofa) in an agricultural area - a problem?**

Coralie Herbst[1], Oliver Keuling[1], Andreas Daim[2], Oliver Burs[3]
[1]University of Veterinary Medicine Hannover Foundation, HANNOVER, Germany
[2]University of Natural Resources and Life Sciences, VIENNA, Austria
[3]University of Bonn, BONN, Germany

11.50 > 12.10 **O.WH.05 - How to live with foxes in an highly urbanized region**

Olivier Beck
Leefmilieu Brussel, BRUSSELS, Belgium

12.15 > 14.00 Lunch

14.00 > 15.35 PARALLEL SESSION 16

Impacts Humans > Wildlife

14.00 > 14.20 **O.HW.11 - Selected heavy metals in the liver and kidneys of European beaver from north-eastern Poland**

Aleksandra Gizejewska, Anna Spodniewska, Dariusz Barski
University of Warmia and Mazury in Olsztyn, Faculty of Veterinary Medicine, OLSZTYN, Poland

14.25 > 14.45 **O.HW.12 - Impact of timber exploitation on western lowland gorilla populations**

Barbara Haurez, Charles-Albert Petre, Jean-Louis Doucet
University of Liège, GEMBLOUX, Belgium

14.50 > 15.10 **O.HW.13 - Lasting effects of anthropogenic disturbance on the spatial ecology of a recovering leopard population**

Julien Fattebert[1], Guy Balme[2], Tristan Dickerson[2], Hugh Robinson[2], Rob Slotow[1], Luke Hunter[2]
[1]University of KwaZulu Natal, DURBAN, South Africa
[2]Panthera, NEW YORK, United States of America

15.15 > 15.35 **O.HW.14 - Effectiveness of wildlife sanctuaries - assessing ungulate and human occurrence simultaneously with camera traps**

Roland F. Graf, Martina Just, Stefan M. Suter
Zurich University of Applied Sciences ZHAW, WÄDENSWIL, Switzerland

14.00 > 15.35 PARALLEL SESSION 17

Interactions Humans-Humans

14.00 > 14.20 **O.HH.11 - Managing conflicts of interest about red deer in the Bavarian Alps, Germany**

Christof Janko, Wolfgang Schröder, Andreas Koenig
TU München, FREISING_WEIHENSTEPHAN, Germany

14.25 > 14.45 **O.HH.12 - How to deal with urban wildlife - the case of Baden-Württemberg, Germany**

Geva Peerenboom
University of Freiburg, FREIBURG, Germany

14.50 > 15.10 **O.HH.13 - Attitudes and perceptions towards conservation success of CAMPFIRE in Zimbabwe**

Tendai Nzuma, Peter Mundy
National University of Science and Technology, BULAWAYO, Zimbabwe

15.15 > 15.35 **O.HW.15 - Impacts of human disturbance on the status of Anatolian Chamois (Rupicapra rupicapra asiatica)**

Hüseyin Ambarli[1], Sitki Eraydin[2], Özgür Alaçam[2], Yasar Kusdili[3]
[1]Middle East Technical University, ANKARA, Turkey
[2]Ministry of Water Affairs and Forestry, ANKARA, Turkey
[3]Local guide at the Department of National Parks, ARTVIN, Turkey

14.00 > 15.35 PARALLEL SESSION 18

Tools for management and research

14.00 > 14.20 **O.TL.34 - Combining harvest data with demographic model to improve the management of red deer populations**

Maryline Pellerin[1], Christophe Bonenfant[2], Jean-Luc Hamann[1], François Klein[1], Mathieu Garel[1], Sonia Saïd[1]
[1]ONCFS CNERA Cervidés-Sanglier, Gertheim, France
[2]UMR CNRS 5558 - LBBE, Université Claude Bernard Lyon 1, VILLEURBANNE, France

14.25 > 14.45 **O.TL.35 - Hunting records and mandible collection as tools for monitoring red deer population in Southern Belgium**

Sabine Bertouille[1], Alain Licoppe[1], Valérie Duran[2]
[1]Département de l'Etude du Milieu Naturel et Agricole - SPW, GEMBLOUX, Belgium
[2]SPW-DNF, NAMUR, Belgium

14.50 > 15.10 **O.TL.36 - A comprehensive annual monitoring program for ungulates with dynamic life histories**

Mark Hurley[1], Paul Lukacs[2], Mike Scott[1], Mark Hebblewhite[2]
[1]Idaho Department of Fish and Game, SALMON, IDAHO, United States of America
[2]Wildlife Biology Program, University of Montana, MISSOULA, MONTANA, United States of America

15.15 > 15.35 **O.TL.37 - The difficulty of implementing the spotlight counts of red deer as abundance indicator**

Alain Licoppe[1], Corentin Gahide[2], Celine Malengreaux[1]
[1]Département de l'Etude du Milieu Naturel et Agricole - SPW, GEMBLOUX, Belgium
[2]Wildlife & Man asbl vzw, GEMBLOUX, Belgium

15.35 > 16.00 Coffee break

16.00 > 16.45 PARALLEL SESSION 16

Impacts Humans > Wildlife [continued]

16.00 > 16.20 **O.HW.16 - Effect of landscape structure and hunting activity on roe deer movement**

Sophie Padié[1], Nicolas Morellet[2], Jean-Louis Martin[1], Simon Chamaillé-Jammes[1]
[1]CEFE - CNRS UMR 5175, MONTPELLIER CEDEX 5, France
[2]Unité de recherche Comportement et Ecologie de la Faune Sauvage (CEFS), CASTANET-TOLOSAN, France

16.25 > 16.45 **O.HW.17 - Hunting bird species considered to be in an unfavourable conservation state, an EU assessment**

Joseph Van der Stegen
European Commission, BRUSSELS, Belgium

16.00 > 16.45 PARALLEL SESSION 17

Interactions Humans-Humans [continued]

16.00 > 16.20 **O.HH.14 - Shifting wildlife value orientations and the effect on wildlife management in the U.S.**

Michael J. Manfredo, Tara Teel
Colorado State University, Fort Collins, United States of America

16.25 > 16.45 **O.HH.15 - Cognitive and emotional approaches to human dimensions**

Jerry V. Vaske
Colorado State University, FORT COLLINS, United States of America

16.00 > 16.45	PARALLEL SESSION 18

Tools for management and research [continued]

16.00 > 16.20 **O.TL.28 - Satellite Radio Tracking of Eurasian Woodcock Scolopax rusticola wintering in Italy: first data**

Michele Sorrenti[1], Nicola Tormen[2], Alessandro Tedeschi[3], Mario Spagnesi[4], M. Bottazzo[5], Laura Guidolin[2]
[1]Federazione Italiana della Caccia, MILANO, Italy
[2]University Padova Biology Dept, PADOVA, Italy
[3]Amici di Scolopax, MUGNANO DEL CARDINALE AV, Italy
[4]Ekoclub, ROMA, Italy
[5]Veneto Agricoltura, LEGNARO, Italy

16.25 > 16.45 **O.TL.39 - How to measure and predict the management impact on red fox population dynamics?**

Nicolas Lieury[1], Sandrine Ruette[2], Sébastien Devillard[3], Alexandre Millon[1]
[1]IMBE - Aix-Marseille Université, AIX-EN-PROVENCE, France
[2]ONCFS CNERA Animaux prédateurs et déprédateurs, BIRIEUX, France
[3]LBBE, UCBL, VILLEURBANNE, France

17.00 > 17.30	CLOSING SESSION

Presentation ***Jan van Haaften Award***
Outgoing IUGB *President Y. Lecocq*
Incoming IUGB *President D. Jimenez-Garcia*

Poster list

POSTER SESSION

□ ■ □

Wednesday **28.08**

12.15 > 14.00

Room Lepus

Topic – Interactions Humans-Humans

P.HH.01 - Acceptance of management techniques in Norway
Liv Jorunn Hind
Bioforsk - Norwegian Institute for Agricultural and Environmental Research, TJØTTA, Norway

P.HH.02 - Wildlife estates label : a tool for promoting good practice for sustainable hunting
Manuel De Tillesse[1], Delphine Dupeux[2]
[1]Département de l'Etude du Milieu Naturel et Agricole - SPW, GEMBLOUX, Belgium
[2]European Landowners' Organization, BRUSSELS, Belgium

P.HH.03 - The valued Maltese tradition of wild birds' live-trapping
Christos Thomaidis[1], Joseph Lia[2], Raymond Cordina[2]
[1]Technological Education Institutte of Lamia, KARPENISI, Greece
[2]Federation for Hunting and Conservation-Malta (FKNK), SLIEMA, Malta

Topic – Impacts Humans > Wildlife

P.HW.01 - Brown bear of the European Russia in at the beginning of the XXI century
Mikhail Vaisfeld
Institute of Geography RAS, MOSCOW, Russian Federation

P.HW.02 - Lynx of the European Russia in XXI century : population, protection, use of resources
Mikhail Vaisfeld
Institute of Geography RAS, MOSCOW, Russian Federation

P.HW.03 - Mallard Anas platyrhynchos in artificial nest sites in Latvia, 1999-2012
Janis Viksne, Arturs Laubergs
Institute of Biology, University of Latvia, SALASPILS, Latvia

P.HW.04 - Extension of the area of the Amur tiger in the Russian Far East, north
Aleksandr Argunov, Aleksandr Senchik
Russian Academy of Sciences Siberian Branch., YAKUTSK, Russian Federation

P.HW.05 - Factors influencing nesting success of ducks
Mara Janaus, Janis Viksne, Aivars Mednis
Institute of Biology, University of Latvia, SALASPILS, Latvia

P.HW.06 - Is game management an acceptable tool of nature conservation actions in protected areas ?
Madeleine Nyman, Hannaleena Mäki-Petäys
Metsähallitus, RASEBORG, Finland

P.HW.07 - Effect of the silvicultural method on the food supply of ruminants
András Náhlik, Gyula Sándor, Tamás Tari, László Dremmel
University of West Hungary Faculty of Forestry Institute of Wildlife Management, SOPRON, Hungary

P.HW.08 - Wild boar at the northern limit of the species range : extreme conditions, high abundance
Ragne Oja, Harri Valdmann, Ants Kaasik
University of Tartu, TARTU, Estonia

P.HW.09 - The private sector rescues wildlife in West Africa
Philippe Bouché, Cédric Vermeulen
ULG Gembloux Agro-Bio Tech, GEMBLOUX, Belgium

P.HW.10 - Restoration of tree nesting population of European Peregrine - methods and population model
Janusz Sielicki
International Association for Falconry, WARSZAWA, Poland

P.HW.11 - Habitat changes and dynamics of brown hare populations in western Po Plain (northern Italy)
Alberto Meriggi, Luca Nelli, Anna Vidus-Rosin, Francesca Meriggi
University of Pavia, PAVIA, Italy

P.HW.12 - Influence of hunting on duikers at the northern periphery of the Dja Reserve, Cameroon
Jacob Willie
PGS-Cameroon, YAOUNDÉ, Cameroon

P.HW.13 - Assessing suitable habitat for lynx (Lynx lynx) along the German-Czech border
Nora Magg, Christoph Heibl, Jörg Müller, Marco Heurich
Bavarian Forest National Park, GRAFENAU, Germany

P.HW.14 - Not less than 2000 hectares! An integrated approach to wildlife management in Walloon farmlands
Layla Saad[1], Amandine Delalieux[1], Simon Lehane[1], Christophe Manssens[1], Marie Vanschepdael[1], Manuel De Tillesse[2]
[1]Fauna & Biotopes, NAMUR, Belgium
[2]Département de l'Etude du Milieu Naturel et Agricole - SPW, NAMUR, Belgium

P.HW.15 - Integrating people and wildlife for sustainable management
Layla Saad[1], Simon Lehane[1], Manuel De Tillesse[2]
[1]Fauna & Biotopes, NAMUR, Belgium
[2]Département de l'Etude du Milieu Naturel et Agricole - SPW, NAMUR, Belgium

P.HW.16 - Dynamics and perspectives of the hunting world. A study in the Rieti province (Italy)
Gabriele Casciani, Settimio Adriani, Marco Bonanni, Vincenzo Ruscitti, Andrea Domeniconi
PIF Environment Committee, RIETI, Italy

P.HW.17 - Similarities and differences in Red Deer and Roe Deer poaching. Rieti (Italy)
Gabriele Casciani, Settimio Adriani, Marco Bonanni, Vincenzo Ruscitti
PIF Environment Committee, RIETI, Italy

P.HW.18 - Hunting disturbance on waterfowl : scientific truth or illusion?
Kathleen Vanhuyse, Dorien Degreef, Gert Michiels
Hubertus Vereniging Vlaanderen, BRUSSEL, Belgium

P.HW.19 - Effect of legislature on game management in Poland
Bartosz Bobek[1], Jacek Maslanka[2], Maciej Ziobrowski[2]
[1]Pedagogical University, CRACOW, Poland
[2]Pedagogical University; Department of Ecology, Wildlife Research and Ecotourism, CRACOW, Poland

P.HW.20 - Habitat improvement actions and pheasant and red-legged partridge land uses
Francesco Santilli, Gisella Paci, Marco Bagliacca
University of Pisa, PISA, Italy

P.HW.21 - Genetic diversity of the Barbary partridge in North-eastern Sardinia
Alberto Meriggi[1], Paola Modesto[2], Cristina Biolatti[2], Simone Peletto[2], Anna Vidus-Rosin[1], Pier Luigi Acutis[2]
[1]University of Pavia, PAVIA, Italy
[2]Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta, TORINO, Italy

P.HW.22 - Demography and habitat requirements of Barbary partridge in Northern Sardinia
Alberto Meriggi, Anna Vidus-Rosin, Linda Mazzoleni
University of Pavia, PAVIA, Italy

P.HW.23 - Differentiation of roe deer density in forests depending on the structure of the landscape
Grzegorz Górecki[1], Andrzej Tomek[2], Mikolaj Jakubowski[1], Robert Kamieniarz[1], Tadeusz Kubacki[2], Magdalena Misiorowska[3], Pawel Nasiadka[3], Henryk Okarma[4], Marek Pudelko[5], Maciej Skorupski[1], Jacek Skubis[1], Marek Wajdzik[2]
[1]Poznan University of Life Sciences, POZNAN, Poland
[2]University of Agriculture in Krakow, KRAKÓW, Poland
[3]Warsaw University of Life Sciences, WARSAW, Poland
[4]Institute of Nature Protection Polish Academy of Science, KRAKÓW, Poland
[5]Forest Research Institute, SEKOCIN STARY, Poland

P.HW.24 - The role of food availability, human conflict and landscape features in wolf occupancy process
Pietro Milanesi[1], Andrea Gazzola[2], Laura Schenone[2], Désirée Signorelli[2], Matteo Serafini[2], Romolo Caniglia[3], Elena Fabbri[3], Ettore Randi[3], Alberto Meriggi[2]
[1]Università di Bologna, BOLOGNA, Italy
[2]Università di Pavia, PAVIA, Italy
[3]ISPRA, OZZANO DELL'EMILIA (BO), Italy

P.HW.25 - The structure of farmlands and the occurrence of field roe deer population in Poland
Robert Kamieniarz
Poznan University of Life Sciences, POZNAN, Poland

P.HW.26 - Effect of supplementary feeding on spatial activity of wild boar during the winter season
Milos Jezek, Tomáš Kušta, Jaroslav Cervený
Czech University of Life Sciences, PRAGUE, Czech Republic

P.HW.27 - Differential control of body mass and wing loading in disturbed rock partridges
Mathieu Boos[1], Arthur Keller[2], Cédric Zimmer[2], Lea Briard[2], Odile Petit[2], Giorgio Malacarne[3], Ariane Bernard-Laurent[4], Jean-Patrice Robin[2]
[1]Research Agency in Applied Ecology, Naturaconst@, WILSHAUSEN, France
[2]CNRS, UMR 7178, 67037 STRASBOURG, France
[3]Dip. Scienze dell'Anbiente e della Vita, Università Piemonte Orientale, 15100 ALESSANDRIA, Italy
[4]ONCFS, CNERA Faune de montagne, GAP, France

P.HW.28 - A small scale habitat selection study : the black grouse in Italy and Scotland.
Luca Nelli, Marco Murru, Alberto Meriggi
University of Pavia, PAVIA, Italy

P.HW.29 - Contemporary condition and the threats to population of Gulo gulo in north-western area
Ludmila Emelyanova
Moscow state university, MOSCOW, Russian Federation

P.HW.30 - Artificial wetland for waterbirds in ricefields : traditional human management for sustainable use of agro-ecosystem
Ellen Vuosalo
NGO/MCCA, Iran

P.HW.31 -Collisions of wild game with trains in central Poland
Karolina Jasinska, D. Krauze-Gryz, M. Wasilewski, J. Werka
Warsaw University of Life Sciences, WARSAW, Poland

Topic – Tools for management and research

P.TL.01 - Camera traps for roe deer population size monitoring ?
Julian Sandrini, Ulf Hohmann
Research Institute for Forest Ecology and Forestry Rhineland-Palatinate, TRIPPSTADT, Germany

P.TL.02 - Testing the efficacy of a floating multicapture trap for invasive Egyptian geese (Alopochen aegyptiacus)
Tim Adriaens[1], Frank Huysentruyt[1], Kim De Bus[2], Karel Van Moer[3], Sofie Standaert[3], Jim Casaer[1]
[1]Research Institute for Nature and Forest (INBO), BRUSSELS, Belgium
[2]Inagro vzw, RUMBEKE-BEITEM, Belgium
[3]RATO vzw, GENT, Belgium

P.TL.03 - Is there a relationship between hare density and soil type?
Margriet G.E. Montizaan[1], Sip E. Van Wieren[2]
[1]Royal Dutch Hunters Association, AMERSFOORT, The Netherlands
[2]Resource Ecology Group, Wageningen University, WAGENINGEN, The Netherlands

P.TL.04 - Effects of weight and temperature on defecation index of caged European rabbits
Marco Bagliacca[1], Francesco Santilli[2], Maria Novella Benvenuti[1], Gisella Paci[1]
[1]University of Pisa, PISA, Italy
[2] CAMPIGLIA M.MA LIVORNO, Italy

P.TL.05 - Mapping of crop damages caused by wild boar with KAP and GIS support
Oliver Keuling[1], Andreas Daim[2], Lara Hauke[1]
[1]University of Veterinary Medicine Hannover, HANNOVER, Germany
[2]University of Natural Resources and Life Sciences, VIENNA, Austria

P.TL.06 - Genetic structure, phylogenetic relationships and forensic DNA of the Cypriot mouflon (Ovis orientalis ophion)
Monica Guerrini[1], Panicos Panayides[2], Giovanni Forcina[1], Mathieu Garel[3], Rita Lorenzini[4], Petros Anayiotos[2], Pantelis Hadjigerou[2], Filippo Barbanera[1]
[1]Department of Biology - University of Pisa, PISA, Italy
[2]Game and Fauna Service, Ministry of Interior, NICOSIA, Cyprus
[3]ONCFS-CNERA, GIÈRES, France
[4]Istituto Zooprofilattico Sperimentale delle Regioni Lazio e Toscana, RIETI, Italy

P.TL.07 - Which type of hares ? Spatial behavior of two differently bred samples of European hare
Paolo Bongi
ATC MS13-Hunting office-, MASSA-CARRARA, Italy

P.TL.08 - Exclosures for determining the effects of moose browsing on young Scots pine volume production
Martha Wallgren[1], Roger Bergström[2], Folke Pettersson[1], Hagos Lundström[1]
[1]Skogforsk, UPPSALA, Sweden
[2]UPPSALA, Sweden

P.TL.09 - Eurasian lynx population model and scenarios of future population development under varying hunting pressure
Katja Holmala
Finnish Game and Fisheries Research Institute, HELSINKI, Finland

P.TL.10 - Influence of mast production on reproduction in wild boar
Marlène Gamelon
ONCFS, CHATEAUVILLAIN, France

P.TL.11 - Falconry methods as tool for rehabilitation of helpless free ranging birds of prey
Thomas Richter[1], Michael Lierz[2]
[1]University of applied sciences Nuertingen-Geislingen, NUERTINGEN, Germany
[2]Clinic for Birds, Reptiles, Amphibians and Fish Justus Liebig University Giessen, GIESSEN, Germany

P.TL.12 - Use of pellet count in the European hare
Jacopo Cerri[1], Marco Ferretti[2], Gisella Paci[3], Clara Sargentini[1], Antonella Grazzini[4], Marco Bagliacca[3]
[1]Università degli Studi di Firenze, FIRENZE, Italy
[2]Game and wildlife management office, PISTOIA, Italy
[3]Department of Veterinary Medicine, University of Pisa, PISA, Italy
[4]Oasi WWF „Dynamo„, freelancer biologist, LIMESTRE, Italy

P.TL.13 - Bioindicators for measurement of red deer pressure on understory vegetation in temperate deciduous forest
François Lehaire, Philippe Lejeune
Université de Liège - Gembloux Agro-Bio Tech, GEMBLOUX, Belgium

P.TL.14 - Introducing a new annual shooting bag survey for the UK
Kate Ives, Matthew Ellis
British Association for Shooting and Conservation, WREXHAM, United Kingdom

P.TL.15 - Meta-analysis : A need for well-defined usage in ecology and conservation biology
Ilse Storch[1], Daniela Vetter[1], Gerta Rücker[2]
[1]University of Freiburg, FREIBURG, Germany
[2]Institute of Medical Biometry and Medical Informatics, FREIBURG, Germany

P.TL.16 - Larsen cage traps : do they work for Carrion crow and Jackdaw ?
Kathleen Vanhuyse, Dorien Degreef, Michaël Vanbriel, Gert Michiels
Hubertus Vereniging Vlaanderen, BRUSSEL, Belgium

P.TL.17 - Population dynamics of wild ungulates in Poland estimated by different methods
Boguslaw Bobek, Jakub Furtek, Katarzyna Kopec, Jacek Maslanka, Dorota Merta, Marta Wojciuch-Ploskonka
Pedagogical University, CRACOW, Poland

P.TL.18 - Population numbers and densities of wild ungulates in north-eastern Poland
Andrzej Albinski[1], Jan Bobek[2], Sylwester Ulejczyk[3]
[1]Forest District Mlynary, MLYNARY, Poland
[2]Forest District Zaporowo, 14-526 PLOSKINIA, Poland
[3]Gorowo Ilaweckie Forest District, 11-220 GOROWO ILAWECKIE, Poland

P.TL.19 - Evaluation of knowledge hunters' : case of night hunting waterfowl.
Sébastien Farau
Fédération des chasseurs de la Gironde, LUDON-MÉDOC, France

P.TL.20 - Monitoring a Partridge population in Flanders
Gert Michiels, Kathleen Vanhuyse, Jonatan Wouters, Dorien Degreef, Michaël Vanbriel, Johannes Mertens
Hubertus Vereniging Vlaanderen, BRUSSEL, Belgium

P.TL.21 - Evaluation of woodcock harvest : use of an adapted statistic methodology, from harvest books
Valérie Cohou, Francois Mimiague, Jerome Werno
FRC Aquitaine, FARGUES SUR OURBISE, France

P.TL.22 - A method for molecular diet analysis of wild boar from their feces
Pierre Brochier[1], Alain Licoppe[2], Sabine Bertouille[2], Céline Malengreaux[2], Eric Baubet[3], Dominique Odier[3], Johan Michaux[4]
[1]Université Catholique de Louvain-la-Neuve, KRAAINEM, Belgium
[2]Département de l'Etude du Milieu Naturel et Agricole - SPW, Belgium
[3]ONCFS, France
[4]ULg, Belgium

P.TL.23 - Urban wild boar management : a resource selection analysis based on eradication data

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P.TL.24 - Modeling a Red deer population reintroduced in an area of Northern Apennines (N-Italy)

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P.TL.25 - Wolf habitat suitability in an area of Northern Apennines : a multimodel approach

Alberto Meriggi, Mauro Perversi, Valentina Dagradi, Olivia Dondina, Pietro Milanesi
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P.TL.26 - Parameterization of the population dynamics of wild boar in Southern Belgium

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P.TL.27 - Assessment and monitoring of forest-game balance : an exclosure experiment

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P.TL.28 - Comparison of two methods to assess red deer abundance during the rutting season

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P.TL.29 - Are VLTB real bovine tuberculosis lesions in red deer and wild boar ?

Rosario Cerrato, Remigio Martin, Waldo Luis García-Jiménez, Elisa Varela-Fernández, David Risco, Pilar Gonçalves, Pedro Fernández-Llario, Javier Hermoso de Mendoza
Universidad de Extremadura, CACERES, Spain

P.TL.30 - Estimation of hunting-pressure on subadult wild boar by capture-recapture methodology in a Mediterranean area

Pedro Fernandez-Llario, Pilar Gonçalves, Maria Gil, David Risco, Waldo-Luis García-Jiménez, Joaquín Rey, Javier Hermoso de Mendoza
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P.TL.31 - Methodical approach of rumen analysis to assess the nutritional energy of roe deer diet

Martina Scheingraber, Wilhelm Windisch, Jürgen Danier, Andreas Koenig
Technical University Munich, FREISING, Germany

P.TL.32 - Evaluation of winter food quality of large herbivores using near infrared reflectance spectroscopy

Michaela Hola
Czech University of Life Sciences Prague, PRAGUE 6, Czech Republic

P.TL.33 - Baltic seals - balancing between sustainable ecosystem management and fisheries (ECOSEAL)

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P.TL.34 - Analysing the first 15 years of game bag records for Flanders, northern Belgium

Thomas Scheppers, Pieter Verschelde, Jim Casaer
Research Institute for Nature and Forest, GERAARDSBERGEN, Belgium

P.TL.35 - Habitat evaluation of biomarkers (carnivores) in riparian vegetation and tropical deciduous forest of Mexico

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P.TL.36 - Small-scale landscape zoning in wolf management to reduce human-wildlife conflicts

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P.TL.37 - Long-term density estimate of roe deer (Capreolus capreolus) in deciduous woods using distance sampling

Denise Neubauer, Gunter Sodeikat
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P.TL.38 - The radio-collared animal as a moving weather station ?

Anne Berger, Alexandre Courtiol
Leibniz Institute for Zoo and Wildlife Research, BERLIN, Germany

Topic – Impacts Wildlife > Humans

P.WH.01 - Onset of Woodpigeon Columba palumbus breeding season in Flanders as based on gonadal development

Frank Huysentruyt, Kristof Baert, Jim Casaer
Research Institute for Nature and Forest, GERAARDSBERGEN, Belgium

P.WH.02 - The study of immunity of raccoon dogs and their litter after antirabies oral vaccination

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P.WH.03 - Evolution and impact of different parameters on badger damage to maize fields in Wallonia

Jessica Delangre, Vinciane Schockert, Clotilde Lambinet, Roland Libois
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P.WH.04 - Damages in young Scots pine (Pinus sylvestris) stands : Who is to blame ?

Karli Ligi, Tiit Randveer
Estonian University of Life Sciences, TARTU, Estonia

P.WH.05 - Fine-scale analysis of wildlife-vehicle collisions in Southern Belgium

François Lehaire, Julie Maron, Kevin Morelle, Philippe Lejeune
Université de Liège - Gembloux Agro-Bio Tech, GEMBLOUX, Belgium

P.WH.06 - Wild boar Berlin - Ecology of wild boar (Sus scrofa) in urban environments

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P.WH.07 - Schmallenberg virus circulation among red and roe deer populations in Belgium

Mutien Garigliany, Rosario Volpe, Julien Paternostre, Daniel Desmecht, Annick Linden
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P.WH.08 - Outbreak of tularemia in Hare and tick-born infection risk for human

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P.WH.09 - Biological background data are needed in assessment of disease spread in the Wild Boar

Konstantin Börner[1], Milena Stillfried[2], Alain Frantz[3], Susan Mouchantat[4], Thomas Müller[4], Conrad Freuling[4], Christoph Staubach[5], Ullrich Wittstatt[6], Rolf Schneider[1]
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P.WH.10 - Impact of Wolf on livestock in Northern Italy and prediction of predation risk

Alberto Meriggi, Olivia Dondina, Valentina Dagradi, Mauro Perversi, Pietro Milanesi
University of Pavia, PAVIA, Italy

P.WH.11 - Spatial analysis of bark-stripping damage by red deer in irregular hardwood forest

François Lehaire, Philippe Lejeune, Grégoire Mercier
Université de Liège - Gembloux Agro-Bio Tech, GEMBLOUX, Belgium

P.WH.12 - Factors affecting predation on livestock by wolves in Liguria, N-Italy

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P.WH.13 - Infection of mycobacterium avium paratuberculosis and mycobacterium avium hominissuis in a wild red deer

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P.WH.14 - Disease situation of red foxes (Berlin) - Importance for healthcare and influence on population dynamics

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P.WH.15 - Magnetic alignment in wild boars (Sus scrofa)

Milos Jezek[1], Jaroslav Cervený[1], Hynek Burda[2], Sabine Begall[2], Vlastimil Hart[1], Pascal Malkemper[2], Tomáš Kušta[1], Petra Nováková[1], Karel Blažek[1]
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P.WH.16 - Aujeszky's disease virus seroprevalence in wild boar, Southern Belgium, 2012

Ludovic Jouant, Jerome Wayet, Rosario Volpe, Virginie Ceuleers, Julien Paternostre, Laurent Massart, Annick Linden
Faculty of Veterinary Medicine, LIEGE, Belgium

P.WH.17 - Detection of Mycobacterium celatum in wild boars in Southern Belgium
Virginie Ceuleers[1], Aloïs Vionnet[1], Fabien Grégoire[1], Rosario Volpe[1], Ludovic Jouant[1], Julien Paternostre[1], Marc Govaerts[2], Annick Linden[1]
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P.WH.18 - An analysis of wildlife human interface in Kenya
Jonathan Kirui
Kenya wildlife service, NAIROBI, Kenya

P.WH.19 - Conservation of and management of bird species at the fishponds of Hortobágy (Hungary)
Péter Gyüre[1], Lajos Juhász[1], Norbert Tóth[1], Péter Juhász[2]
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P.WH.20 - Can supplementary feeding as a management tool reduce browsing impact on commercial trees ?
Karen Marie Mathisen[1], Jos M. Milner[1], Floris M. Van Beest[2], Christina Skarpe[1]
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[2]University of Saskatoon, Canada

Topic – Interactions Wildlife-Wildlife

P.WW.01 - Ecological impacts of an invasive species in Wallonia, the raccoon (Procyon lotor)
Irene Campos Martinez, Jérémy Gautherot, Clotilde Lambinet, Vinciane Schockert, Roland Libois
University of Liege, ALLEUR, Belgium

P.WW.02 - Skrjabingylus nasicola as a parasite of Irish stoats (Mustela erminea hibernica, Thomas & Barrett-Hamilton 1895)
Kieran P. Buckley[1], Peter Stuart[2], Colin Lawton[2], D. Paddy Sleeman[3]
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P.WW.03 - A wolf (Canis lupus) as a primary regulator of ungulates population of Amur region
Aleksandr Senchik, Evgeniia Bozhok, Mikhail Axentyev, Yury Lohov Lohov
Far East State Agrarian University, BLAGOVESCHENSK, AMUR REGION, Russian Federation

P.WW.04 - Wood bison (Bison bison athabascae Rhoads) in central Yakutia
Valery Safronov, Roman Smetanin, Evgeny Zakharov
Institute for Biological Problems of Cryolithozone SB RAS, YAKUTSK, Russian Federation

P.WW.05 - Size and demographic structure of tundra reindeer populations (Rangifer tarandus L.) in North-East Asia
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P.WW.06 - The Roe deer genetic variation in different forest bioclimatic regions of Lithuania
Gintare Narauskaite, Darius Danusevicius, Kestutis Petelis, Gediminas Brazaitis
Aleksandras Stulginskis University, KAUNAS DISTRICT, Lithuania

P.WW.07 - The population status of the woodpigeon in Eastern Europe
Antonio Bea[1], Saulius Svažas[2], Gennady Grishanov[3], Alexander Kozulin[4], Alexander Mischenko[5], Valentin Serebryakov[6], Iñaki Olano[7]
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[7]EKOS ESTUDIOS AMBIENTALES,S .L.U., LASARTE-ORIA, Spain

P.WW.08 - Population dynamics of hunting mammals in Russian Middle Amur area : external factors influence
Efim Frisman, Efim Frisman, Oxana Revutskaya, Galina Neverova
Institute for Complex Analysis of Regional Problems, BIROBIDZHAN, Russian Federation

P.WW.09 - Population dynamics of game animals in Russian Middle Amur area : results of simulation
Galina Neverova, Efim Frisman
Institute for Complex Analysis of Regional Problems, Far-Eastern Branch of the R, BIROBIDZHAN, Russian Federation

P.WW.10 - Ecological niche differentiation : How do barking deer and four-horned antelope manage to coexist ?
Krishna Pokharel, Ilse Storch
University of Freiburg, FREIBURG, Germany

P.WW.11 - The role of carnivore vs. conspecific scents on rodents' behaviour and seed dispersal
Pau Sunyer[1], Josep Maria Espelta[1], Alberto Muñoz[2], Raúl Bonal[3]
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[3]Instituto de Recursos Cinegéticos (CSIC-UCLM-JCCM), CIUDAD REAL, Spain

P.WW.12 - The status and population genetic structure of Mallard Anas platyrhynchos in Eastern Europe
Saulius Svažas[1], Dalius Butkauskas[1], Alexandre Czajkowski[2], Aniolas Sruoga[3]
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[2]European Institute for Management of Wild Birds and their Habitats, PARIS, France
[3]Vytautas Magnus University, KAUNAS, Lithuania

P.WW.13 - Intraspecific diversity of Capercaillie Tetrao urogallus population in Belarus
Dalius Butkauskas[1], Simona Stropaityte[1], Alexander Kozulin[2], Aniolas Sruoga[3], Saulius Švazas[1]
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[3]Vytautas Magnus University, KAUNAS, Lithuania

P.WW.14 - An ICE-based monitoring for roe deer in sympatry with red deer in Belgium
Céline Malengreaux, Alain Licoppe
Département de l'Etude du Milieu Naturel et Agricole - SPW, GEMBLOUX, Belgium

P.WW.15 - Investigations of Sarcocystis rileyi infection in birds of the order Anseriformes in Europe
Petras Prakas[1], Anti Oksanen[2], Dalius Butkauskas[1], Aniolas Sruoga[3], Saulius Svažas[1]
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[3]Vytautas Magnus University, KAUNAS, Lithuania

P.WW.16 - Influences of fox (Vulpes vulpes) on Natura2000 and game species : a literature study
Michaël Vanbriel
Hubertus Vereniging Vlaanderen, SCHAARBEEK, Belgium

P.WW.17 - Habitat selection by wolves in Ligurian Apennines (North-western Italy)
Alberto Meriggi[1], Elisa Torretta[1], Pietro Milanesi[1], Matteo Serafini[1], Laura Schenone[2], Desirée Signorelli[2]
[1]University of Pavia, PAVIA, Italy
[2]Parco Regionale Antola, BUSALLA (GE), Italy

P.WW.18 - Mothers Baby, Fathers Maybe : occurrence and frequency of multiple paternities in European Wild Boar
Björn Müller, Christian Glensk, Jörg Brün
University of Bonn, BONN, Germany

P.WW.19 - IMPACTBOAR : analyzing the impact of wild boar expansion in alpine and sub-alpine Pyrenean environments
Josep Maria Espelta[1], Ferran Navàs[2], Alberto Muñoz[3], Marc Fernández[2], Pau Sunyer[1], Carme Rosell[2]
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P.WW.20 - Brown hare abundance after wildfires in Mediterranean ecosystems
Christos Sokos, Periklis Birtsas, Konstantinos Papaspyropoulos, Alexis Giannakopoulos, Charalambos Billinis
Hunting Federation of Macedonia & Thrace, THESSALONIKI, Greece

P.WW.21 - An exclosure experiment to assess the impact of ungulates on plant diversity in Belgium
François Vandenschrick[1], Julien Lievens[2], François Lehaire[1], Alain Licoppe[2]
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P.WW.22 - Population status, density and trends of chukar partridge (Alectoris chukar) in Greece
Eleni Dedousopoulou[1], Evaggelos Chatzinikos[1], Dimitrios Kiousis[1], Vasileios Bontzorlos[2], Christos Thomaides[3]

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P.WW.23 - Population density and trends of Wild boar (Sus scrofa) in central Greece

Eleni Dedousopoulou[1], Evaggelos Chatzinikos[1], Vasileios Bontzorlos[2], Dimitrios Kiousis[1], Christos Vlachos[3], Dimitrios Bakaloudis[3]
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P.WW.24 - Wild boar movement ecology : all what we (would need to) know

Kevin Morelle[1], Céline Prévot[2], François Lehaire[1], Philippe Lejeune[1]
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P.WW.25 - Comparing risk analyses of some potential invasive mammal species in Western Europe

Vinciane Schockert[1], Etienne Branquart[2], Evelyne Baiwy[1], Roland Libois[1]
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P.WW.26 - Examination of genital organs and characteristics of epididymal spermatozoa from Siberian roe deer

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[1]Institute of Animal Reproduction and Food Research, OLSZTYN, Poland
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Keynote Speakers

Changing wildlife-to-wildlife interactions : key issues and challenges in North America

Dr Winifred B. KESSLER
President «The Wildlife Society»,
Prince George, BC, Canada

Many emerging challenges for wildlife managers involve changing relationships between species. These problems require us to go beyond the traditional focus on population dynamics and habitat relationships of individual species, to address the ecology of multiple species and the interactions, often complex, that occur between them. As a key science and education organization for the wildlife profession, The Wildlife Society (TWS) is involved in many of these issues. TWS strives to inform wildlife policies and management by disseminating knowledge gained through research and practice. As well, TWS and its members take positions on important issues that affect wildlife, advocating for science-based policies and solutions.

The challenges can be great for wildlife-to-wildlife issues having the characteristics of "wicked problems," a term applied when potential science-based solutions are constrained or confounded by differing social values and mindsets (i.e., the "human dimensions"). While rooted in biology and inter-species relationships, such issues have social, economic, or political components that add complexity and difficulty. Even in cases where the science is clear, these human dimensions may be the biggest obstacle to achieving management solutions. Some important North American issues that TWS is working on have those characteristics. Let's consider some examples.

Wolf-ungulate management

Once distributed throughout most of North America, by the 1970s gray wolves were nearly extirpated from the contiguous U.S. states. After listing the species under the Endangered Species Act, the U.S. Fish and Wildlife Service commenced efforts in 1995 to reintroduce wolves into the northern Rocky Mountains. Between these efforts and natural ingress of wolves from Canada, wolf populations rebounded, numbering at least 1,650 wolves in 244 packs by 2010. Some ungulate populations have shown steep declines; however, efforts to de-list the wolf and reinstate state authority (thus allowing population management) were repeatedly fought in court. In the latest round the U.S. Fish and Wildlife Service has made a decision to de-list wolf populations throughout the U.S. from federal protection, but the legal challenges continue.

Changing wolf-ungulate interactions are also challenging wildlife managers in Canada, where wolf populations have always been strong. The conservation of woodland caribou in the face of escalated mining and energy development is a major issue in British Columbia. Caribou populations are in steep decline and the proximate cause appears to be changing species interactions. Roads, seismic lines, and energy corridors are opening up the large tracts of forest inhabited by caribou and stimulating growth of shrubs and young trees. This causes moose, deer, and elk to move into forests they formerly avoided. Wolves and bears are not far behind and for caribou, this means greatly increased risk of predation.

Wild horses and burros

Free-roaming herds of horses and burros occur on nearly 20 million hectares of public lands in 10 western U.S. states. These herds formed from escaped domesticated stock, including descendants of the horses brought by Spanish explorers in the late 1500s. They cause serious damage to native wildlife and rangeland habitats by trampling vegetation, packing soils, over-grazing forage, and competing for scarce water sources. Although non-native, these horses are considered "icons of the west" by vocal segments of society and are protected by the Wild Horses and Burros Act. The basic management approach is to round up excess animals, offer them for adoption, and maintain the unwanted ones in captivity. Today about 37,000 horses (well above carrying capacity) roam on public lands and 32,000 are kept in corrals and pastures at enormous expense to taxpayers. Two recent developments may offer help on this difficult management issue : 1) completion of a National Academy of Sciences report on "Using Science to Improve the BLM Wild Horse and Burro Program : A Way Forward; and 2) the new TWS-led National Horse and Burro Rangeland Management Coalition.

Endangered species dilemmas

Preventing the extinction of species is an important wildlife management priority in North America, mandated by national laws in both the United States (Endangered Species Act) and Canada (Species at Risk Act). The U.S.'s most controversial species ever, the northern spotted owl, has been protected in large reserves of old-growth forest. But today the major threat is a changed species interaction. The barred owl has expanded its range and is displacing the smaller, less aggressive spotted owl. Authorities in both the U.S. and Canada have proposed to kill or capture barred owls where they threaten spotted owl survival. This biological solution is strongly opposed by people who accuse government of inhumane ethics and "playing God" in the matter of species conservation. Similar outrage occurred when biologists in British Columbia killed golden eagles in order to reduce predation on Canada's most highly endangered species, the Vancouver Island

marmot. As habitats and species ranges shift in response to warming climate, we can expect more changes in species interactions involving endangered species, creating difficult decisions and ethical dilemmas for managers and policy-makers.

Emerging wildlife diseases

Diseases have become a major concern in our profession, including zoonoses that can pass between wildlife and humans. Strange new fungal infections, such as white-nosed syndrome in bats and chytrid fungus in amphibians, are spreading species to species and causing major population declines across broad geographic areas in North America. Chronic wasting disease (CWD) in deer and elk populations is an enormous concern; caused by prions, it is always fatal and there is no cure. CWD spreads to wild populations from facilities that confine and breed deer and elk. Invasive species and feral animals such as swine and cats are also major sources of disease transmission to wild populations, and both are on the rise. While there are strong biological arguments to be made against confined ungulates and feral populations, these too have their human supporters and this creates additional challenges for wildlife conservation and management.

Wini Kessler *is a Certified Wildlife Biologist and the 2012-13 President of The Wildlife Society. Her 40-year career in wildlife research, education, and management includes faculty positions at three American and Canadian universities and two decades with the U.S. Forest Service. In 2010 she retired from the Forest Service as the Alaska Regional Director for Wildlife, Fisheries, Ecology, Watershed, and Subsistence Management. She is a current member of the Wildlife and Hunting Heritage Conservation Council, which advises the U.S. Secretary of the Interior and Secretary of Agriculture in matters concerning America's wildlife resources and shooting sports. Her current board positions include the Habitat Conservation Trust Foundation, which invests $5-6 million annually in conservation projects in British Columbia, and the Ecosystem Management Research Institute. She has been a professional member of the Boone &Crockett Club for the past 20 years, currently serving as the research and education editor for the Club's magazine, Fair Chase. Wini's education includes bachelors and masters degrees from the University of California at Berkeley and PhD from Texas A&M University. She lives in rural British Columbia and travels widely in pursuit of hunting and other outdoor activities.*

Wildlife Welfare Management : balancing science and society

Prof Frauke OHL
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Animal welfare issues are a matter of increasing societal and political debate. One major aspect of this debate seems to be the question whether criteria used for welfare assessment in wild (i.e. freely living) animals are, or should be, different from those used in animals managed more closely and, further, what constitutes wild, or ultimately man-managed populations. Notably, legal frames with respect to animals are clearly context-dependent and there may thus be a distinction between responsibilities towards farm animals, lab animals, companion animals, closely managed wildlife, and truly wild animals experiencing little management input. Recently, in the NL and the UK [and here especially Scotland], first approaches have been undertaken to establish national frameworks for wildlife management and to define responsibilities of managers specifically for welfare, as well as to establish guiding Codes of Practice for wildlife management practice (Scottish Government 2008; Scottish Natural Heritage 2012; RDA 2013; Ohl & Putman 2013).

In an attempt to extend principles of welfare management to free-ranging wildlife, current biological perspectives of what constitutes (and affects) welfare and general concept of animal welfare will be reviewed. Recent concepts suggest that an animal's welfare status might best be represented by this adaptive capacity. Assessment of welfare should therefore focus not so much on the challenges which any animal or a group of animals may face at a given moment but on whether or not the animal or group has the freedom and capacity to react appropriately to both positive and potentially harmful (negative) stimuli.

An adaptive response may take some finite period of time; crucially therefore assessment of welfare should not simply consider the status of any individual at a given moment in time. In addition it is also clear that animals' assessment/perception of a given environmental challenge shows significant inter-individual variation and that there is also equivalent variation in adaptive capacity and coping strategy. In consequence, the (objectively determined) welfare status of all members of any group of animals may appear to vary over a considerable range, yet all individuals perceive their own welfare state as optimal – or at least satisfactory. Further, at least among social species, it is probable that individual welfare should be re-evaluated as

being related to the functioning of a social group, taking into account that a variety of situations exist where (social) individuals invest into the welfare of other individuals instead of maximising their own welfare.

Based on this review we offer operational definitions for welfare, what is meant by positive or negative welfare and what constitutes suffering. In brief :

Welfare describes an internal state of an individual, as experienced by that individual. This state of welfare is the result of the individual's own characteristics, as well as the environmental conditions to which the individual is exposed. Negative/bad welfare status [or suffering] describes a state that the animal itself perceives as negative. Short-term, negative welfare states such as suffering from hunger and fear serve as triggers for the animal to adapt its behaviour. They therefore serve a function. A brief state of negative welfare or suffering may fall within an animal's adaptive capacity, and would not necessarily require intervention. Welfare status is more significantly compromised when an animal or a group of animals have insufficient opportunity (freedom) to respond appropriately to a potential welfare 'challenge' through adaptation by changes in its own behaviour.

It is clear however that animal welfare issues cannot simply be addressed by means of objective (scientific) biological measures of an animal's welfare status under certain circumstances. In practice, interpretation of welfare status and its translation into the active management of perceived welfare issues are both strongly influenced by context and, especially, by cultural and societal values. In assessing whether or not a given welfare status is morally acceptable, animal welfare scientists must be aware that even scientifically based, operational definitions of animal welfare will necessarily be influenced strongly by a given society's moral understanding.

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Frauke Ohl *is appointed at the Veterinary Faculty, Utrecht University as full professor on Animal Welfare & Laboratory Animal Science since 2004. Since 2006 she is head of the department Animals in Science & Society and, since 2011, she is chair of the Dutch Council on Animal Affairs. Her research in Utrecht is focused on the investigation of emotional and cognitive processes in animals, aiming at increasing our understanding of the animal's perception of its own state of welfare.*

What is 'damage' and when do game-ungulates become more of a burden than a benefit ?

Prof Dr Rory PUTMAN,
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Taking ungulates as an example, this paper will explore the various interactions between humans and game animals, both positive and negative, to try and set the context for other papers in the session.

In effect the impacts caused by wild ungulates on natural or anthropogenic environments is ecologically neutral - neither intrinsically good or bad from an ecological perspective. We consider such impacts positive or negative simply in relation to human-contrived subjective assessment of whether or not they assist with or conflict with our own land-management objectives for a given area.

Against that background, I will first review the range of beneficial impacts of ungulates : as an integral part of natural ecosystems; wild ungulates as a resource for meat and recreation, before then reviewing negative impacts of ungulates on human activities : through impacts in agriculture and forestry, through damage caused to conservation vegetation; as vectors of human or animal diseases and through implication in vehicle collisions etc. The extent of such impacts and their ecological and economic significance will be quantified by example where possible.

In considering such positive and negative impacts I will explore the environmental and other factors associated with a given level of impact; it is clear that in many cases impacts are only weakly related to animal density and that many other factors may influence recorded impacts even at the same given population density. To focus discussion, I will consider if it is possible to define in each ecological context, specific and quantifiable thresholds below which ungulate impacts may prove acceptable, but above which damaging impacts may be anticipated. Such exploration will highlight that density of ungulate populations is not itself sufficient to predict whether or not impacts in a given situation are acceptable, or potentially damaging, and that impacts will be affected also by numerous other ecological (and economic) factors.

THIS PRESENTATION WILL BE BASED IN PART ON WORK SUMMARISED IN :

- *Putman, R.J., Langbein, J., Green, P. and Watson, P. (2011)* ***Identifying threshold densities for wild deer in the UK above which negative impacts may occur.*** *Mammal Review 41, 175-196.*

OTHER RELEVANT PUBLICATIONS BY THIS AUTHOR :

- *Reimoser, F. and Putman, R.J. (2011) Impact of large ungulates on agriculture, forestry and conservation habitats in Europe. In :* ***Ungulate Management in Europe : Problems and Practices*** *(eds. R.J. Putman, M. Apollonio and R. Andersen), Cambridge University Press, 144-191 (ISBN 978-0521-76059-1)*

- *Apollonio, M., Andersen, R., and Putman, R.J. (eds.) (2010)* ***European Ungulates and their Management in the 21st century.*** *Cambridge University Press. ISBN 978-0521-76061-4*

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Professor Rory Putman *was for many years head of the Deer Management Research Group at the University of Southampton UK, before 'retiring' to set up in practice as a freelance ecological and wildlife management adviser in Scotland. He is an Emeritus Professor of Manchester Metropolitan University and currently holds Visiting Professorships at the University of Utrecht and the Institute of Biodiversity of the University of Glasgow.*

The Common Agricultural Policy (CAP) and its impact on European hares

Prof Dr Klaus HACKLÄNDER
Institute of Wildlife Biology and Game Management, University of Natural Resources and Life Sciences (BOKU), Vienna, Austria

Hares followed man after agricultural land use lead to open landscapes suitable fort his lagomorph species. In line with land use changes habitat suitability for small game varied over the last centuries. Currently, the fate of European hares is predominantly affected by the Common Agricultural Policy (CAP) of the European Union and the global market of agricultural products.

We studied the effects of land use, field size, crop types on hares dwelling in arable land for 15 years. With the help of telemetry, hunting bag analysis, food selection indices and reproductive parameters I will show the challenges for hares in our current agriculture and I will present future directions to reconcile sustainable land use and the conservation of small game species.

Prof. Dr. Klaus Hackländer *is a „lagomorphologist" since 1997, member of the IUCN SSC Lagomorph Specialist Group and co-founder of the World Lagomorph Society. He teaches wildlife ecology and wildlife management at the University of Natural Resources and Life Sciences, Vienna (BOKU) where he is head of the Institute of Wildlife Biology and Game Management.*

Attitudes and wildlife management—Moving beyond the educate the public model

Prof emeritus Dr Thomas A. HEBERLEIN,
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"You keep studying attitudes, but they don't get any better," was the lament from a biologist after a presentation on attitudes toward wolves at the IUGB in Barcelona. The dominant wildlife management paradigm is to study nature so it can be manipulated to produce desired outcomes. This model frequently carries over to human dimensions. Managers and wildlife scientists want to learn about public attitudes with the goal of changing them by "educating the public." The hope is that these changed attitudes will produce desired behaviors. This "knowledge-deficit model" or Cognitive Fix, as I call it (Heberlein, 2012), is flawed by assuming that attitudes are easily changed and that there is clear relationship between attitudes and behavior. While attitudes do occasionally change rapidly these changes are difficult to either predict or control. Attitudes are most often stable. That is what makes them important. It is difficult if not impossible to change well developed, identity based, stakeholder attitudes toward wildlife. Furthermore behavior is determined more by situation, norms and social influence than by attitudes. The challenge of wildlife management is to move beyond this "Educate the Public model".

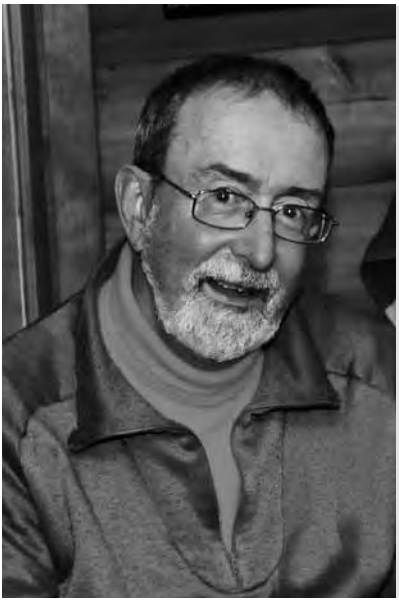
Aldo Leopold, the father of wildlife ecology in the US , provides a good example of how attitudes function. In 1909 when he shot the wolf described in his most famous pro-wolf essay, "Thinking Like a Mountain". He barely mentions it in a letter detailing game taken that weekend. It was normative to shoot a wolf. As he says in his essay : "We had never heard of passing up a chance to shoot a wolf." For another decade Leopold called for the extermination of all wolves and other predators. It took him another 25 years to change his attitude. Shortly after writing about his changed attitude toward wolves, Leopold in his role as conservation commissioner had to vote on a policy to restore bounties on wolves in Wisconsin. Professor Leopold, the man with the changed attitude, voted in the opposite direction—to pay people to kill wolves. Leopold isn't alone. In landmark study on poaching saiga antelope presented at the IUGB in Moscow, a team from Imperial College in London concluded after three years of research that "there is no association between attitudes and poaching" (Kühl et al. 2009 :1447).

Social psychologists who have studied attitudes for three quarters of a century are well aware of these problems, but this knowledge is not part of general training in wildlife biology. My goal has been to make this science more available for wildlife professionals in my book Navigating Environmental Attitudes (Oxford, 2012). As I describe in that text I find it useful to think of attitudes like rocks creating a rapids in the river. Many are beneath the surface and hard to see. So we need to be able to read the water, to know where the rocks lie to navigate. Just because we can not change the position of the rocks as we head our canoes into a rapids does not mean that we do not need a good understanding of their position. This is the appropriate role of human dimensions research--to help chart the waters, so that we can design successful programs that take attitudes and human behavior into account.

What to do if we can't change attitudes? There are lots of things. First we need to go beyond what I call the cognitive fix keeper hole, where we continue to focus on attitude change as the ONLY solution. We must rather understand the community and social context of the situation and make our changes there. A team studying snow leopards discovered they could promote and improve women's handicraft and get woolens sold in a US market. This increased incomes by over 40% for over 400 herder families in 29 communities. A contract was established with where the women and the community would get a 20% bonus if there was no snow leopard or wild ungulate poaching, and it was more than a decade before the next snow leopard was poached. This was great success without educating the public about snow leopard biology or changing attitudes toward the animal. (Jackson et al. 2010, Mishra et al. 2003)

Sometimes we don't have to change attitudes at all, but rather just believe our data. In 1990 when there were about 20 wolves in the state of Michigan in the US, Stephen Kellert and I did a survey showing strong positive attitudes toward wolves among general public and even among hunters and trappers. How do we "educate the public" the mangers asked? We said, "you don't have to—the public likes wolves." I don't think the managers ever believed our findings. Today there are over 600 wolves in Michigan today which I am quite sure is due to these strong attitudes and the associated norms. A meta analysis I did with my students showed strong positive attitudes toward wolves over three decades (Williams et al. 2002). Should it be any surprise that wolves are back in the US and Sweden and in many other places in Europe? Just because you can't change attitudes at will doesn't mean that they are not important for nature management.

In the study that troubled the biologist at the last IUGB it turned out that 81% of the respondents supported wolf protection (Glickman et al. 2011) How much better are attitudes supposed to get? And why would you want to change them even if you could? In this keynote I describe in more detail how attitudes function, why they are important even if we can't change them, and the appropriate role of human dimensions in wildlife research.



***Tom Heberlein**, an environmental sociologist, began studies of human dimensions of wildlife in 1977 with research on Wisconsin deer hunters. Twenty five years ago he gave his first paper at the IUGB in Poland. A decade ago he moved to Sweden on a part time basis, and began co-teaching a human dimensions of fish and wildlife course with Göran Ericsson. He is currently professor emeritus in the Department of Community and Environmental Sociology at the University of Wisconsin-Madison and in the Department of Wildlife, Fish and Environmental Studies at the Swedish University of Agricultural Sciences, Umeå*

RECENT PUBLICATION

***Navigating Environmental Attitudes**, by Thomas A. Heberlein, Oxford University Press, Oxford, 2012, pp. 227, $24,95, hbk ISBN 978-0-19-977332-9*

Dr Jean-Michel GAILLARD
Director of Research, Laboratory «Biometrics & Evolutionary Biology»,
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The Laboratory for Biometry and Evolutionary Biology (LBBE) is part of the French *Centre National de la Recherche Scientifique* CNRS (Unit 5558) and the University of Lyon. One of its three Departments focuses on evolutionary processes at the genetic level and includes the Group on Evolution and Populations, covering population genetics, molecular biology, bioinformatics and mathematical modeling. Dr Jean-Michel GAILLARD is Group leader.

Abstracts
Oral presentations

Interactions Humans-Humans

O.HH.01

‘Human dimension’ in wild boar management

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KEYWORDS : hunters opinion ; hunting management ; survey ; Sus scrofa

Wild boar hunting bags are on a very high level in Germany and all over Europe; populations are still increasing and dispersing into agrarian landscapes. For ecological and economic reasons a sound hunting management is indispensable to regulate or even reduce wild boar populations. Important topics for a regulative hunting management of wild boar besides others are knowledge of wild boar biology, hunting management, as well as willingness and possibilities of hunters (‘human dimension’). Thus, surveys are conducted in Lower Saxony (LS) on distribution, detailed hunting statistics as well as the spectrum of opinion of the hunters.
Within the last 50 years wild boar population was spreading from forested areas all over LS, thus, it is nearly area-wide distributed. Only in 17% of hunting grounds wild boar do not occur. In more than 50% of the area wild boar is a common species. 65% of wild boar are shot on single hunt. Hunting at bait is the most common hunting method in LS. Unless other methods are not promoted this hunting method is still indispensable. During the last five years the proportion of wild boar shot on drive hunts has increased by 10%. The proportions of hunting methods within hunting statistics are differing regionally due to different possibilities, landscape structures, needs, and opinions. A high proportion of hunters did not answer the questions on opinion and willingness, possibly showing a lack of knowledge or opinion. Most hunters think a reduction in LS is necessary; however, many of those do not think it is necessary in their own region. Shooting piglets at an age earlier than 4 months is unpopular, although an early start of reducing the offspring would be needed for regulation and for avoiding crop damages by banishing wild boar. Of those who answered 40% think that they were not able to regulate wild boar populations. Most of those who believed in ‘regulation’ shot less than actually needed.
Comprehensive hunting is expected to be most productive for regulation, non-hunting methods are really unpopular. Drive hunts are not conducted as often as needed due to a high effort and a fear of disturbing other species, as red deer.
Due to hunters’ opinion, the hunting bags are not increasing in their own hunting ground. It seems to be ‘somebody else´s problem’. Thus they do not see a necessity for reduction as it is ‘only’ a common problem. It is to state that wild boar populations are still increasing and dispersing. Hunting management has to be highly efficient for regulation, thus cooperation has to be augmented. Hunters are aware of these problems; however, do not implement this knowledge due to several reasons, which will have to be investigated in future. Some first results show, that hunters are afraid of reducing wild boar as hunting might get less attractive. Sustainability seems to be one of the biggest purposes of hunters, thus they do not dare reducing.
Regional conditions, as well as hunters’ willingness and possibilities have to be incorporated into management concepts.

O.HH.02

A bottom-up approach for defining criteria, indicators and impacts for wild boar management

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KEYWORDS : damage ; participatory approach ; Sus scrofa ; workshops

Since 2006 wild boar reappeared at different places in Flanders after a long period of absence. Given the highly fragmented nature of Flanders, the dense habitation and the overall mixture of small nature areas, roads, railways, urbanized areas and agriculture, the management of wild boar in Flanders poses serious challenges. Moreover the system of hunting rights linked to landownerships, combined with the current hunting and nature legislation, seems to be an obstacle rather than a tool for an effective and efficient wild boar management in the region. In the province of Limburg the Agency for Nature and Forest therefore took the initiative for a collaborative impact management project together with all stakeholders involved.
The Institute for Nature and Forest research (INBO) was given the task to identify and develop criteria and indicators that can be used to monitor and evaluate the wild boar management and its impacts. In order to guarantee that the result would be as complete as possible and no issues would be forgotten, a bottom-up approach with all stakeholders was chosen. Moreover this approach guaranteed that the different stakeholders endorsed the methods used and the resulting list of criteria and indicators.
During three workshops stakeholders listed desired future conditions which should be the result of a good wild boar management in the region and identified the characteristics on which management actions should have to comply with. Furthermore, indicators were proposed for each of these criteria and characteristics. Finally, participants of the workshops defined the information needed for these indicators and identified possible sources for the required information. Based on the listed criteria and indicators an attempt was made to identify and categorize the impacts that mattered for the participating stakeholders.
The above approach resulted in an extensive list of criteria and indicators, which from a practical point of view cannot be implemented all together. In addition, the feasibility of certain indicators will depend on the scale on which the information should be collected. To select a subset of criteria and indicators to be used in practice, the scale of the management plan first has to be decided on and a choice has to be made on how and by whom the subset will be selected. These choices can be made either bottom-up or top-down.

O.HH.03

Hunters' and farmers' attitudes to the management of the wild boar in Sweden

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KEYWORDS : crop damages ; game management ; hunting ; wild boar

Management of the wild boar is a contentious issue all over Europe, as populations and damages to crops increase. In Sweden, the wild boar was reintroduced 30-40 yrs ago. Today, the geographical distribution covers southern and central Sweden and the population is increasing still. At the same time, conflicts with agriculture are increasing. At the core of the conflict is the focus of wild boar management in general and supplementary feeding in particular. It is easy to attract wild boars through feeding and legal supplementary feeding may also influence the timing and investment in reproduction. Thus, hunters interested in having strong populations of wild boar can achieve this with relative ease also on small parcels of land. This may not be in the interest of neighbouring estates, or farmers leasing the arable land on the same estate.
We performed a survey of hunters' attitudes to the size of the wild boar population on their hunting grounds. The attitudes were compared to bag statistics and records of wild boar establishment. Looking at all the counties with wild boar combined, hunters wanted stronger populations of wild boar. There were large geographical differences, however. In southern Sweden, hunters wanted fewer wild boars, whereas the opposite was true in central Sweden where populations of wild boar were less dense. Hunters that were landowners were much more skeptical to wild boars in the south, than other hunters. In central Sweden, there were no differences in attitudes between hunting landowners and other hunters.
Furthermore, we performed a survey of farmers' attitudes to the size of the wild boar population. Virtually all farmers who claimed to have an established population of wild boar on their land wanted fewer wild boars.
The Swedish wild boar population is still fragmented, also in counties where the wild boar has been present for decades. Thus, there is a large variation in population size at the local and the regional levels. There is a concomitant variation in attitudes even within groups of stakeholders. A successful wild boar management absolutely requires collaboration across estates and across groups of stakeholders. It is essential to take the variation in attitudes into account when formulating management plans and addressing the raging conflicts.

O.HH.04

An integrated approach to wild pig (Sus scrofa) management

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KEYWORDS : education ; integrated approach ; management ; wild pig

In the U.S., wild pigs (*Sus scrofa*) are non-native, invasive pests that pose a significant threat to ecosystems, watersheds, agriculture, forestry, native plant and animal communities, and human health. Wild pigs are perhaps the greatest vertebrate modifiers of natural plant communities by their rooting and trampling which impacts plant regeneration, community structure, soil properties, nutrient cycling, and water infiltration. Wild pigs cause problems for native wildlife by competing for food and other resources, direct predation, and by the spread of disease and parasites. In aquatic systems, wild pig activity reduces water quality and can increase the level of fecal coliforms in streams to exceed human health standards. Today, wild pigs are both numerous and widespread throughout the United States, with a distribution in at least 39 U.S. states. The only long-term solution to many of these problems is reducing both the size and range of pig populations. Such a strategy of population reduction can only be achieved via awareness of the problems among natural resource policy makers and professionals and knowledge about the techniques for controlling wild pigs among land managers. Unfortunately, reliable information about the risks of wild pigs and about management strategies is not readily available. We have assembled a team of Researchers, Extension Professionals, Veterinarians, Disease Biologists, Human-Wildlife Specialists, and Government agencies to take an aggressive and integrative approach to controlling and managing wild pigs throughout the United States. Our approach is unique and uses the framework of educational and communication products as a foundation to inform and equip both the public and scientific communities. Using a world-wide platform, we have developed a website that allows users to easily assess the risks of wild pigs, and then if desired, to implement effective control programs. In addition, our approach raises awareness of the wild pig epidemic to policy and decision makers at the state level and provides them with a 'turn-key' set of educational products for reference and dissemination. The educational materials that we have developed include an international conference, technical guide, landowner manual and video that serve to empower landowners and natural resource professionals with management options. Our integrated approach also includes on-site regional workshops that feature a mobile trapping unit to allow hands-on experience in setting and baiting traps. We believe our hierarchical approach is effective on both the regional, national, and international levels, and can serve as a model for future wildlife programs that endeavor to address large-scale management issues.

O.HH.05

The attempt to use the driving sense method for large-scale inventory of red deer (Cervus elaphus L.) and wild boar (Sus scrofa L.)

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KEYWORDS : Cervus elaphus ; driving sense ; inventory ; red deer

In the winter 2012 the large-scale inventory of big game was done in the North-Western part of Poland on the territory of Regional Directory of State Forest (RDSF) in Szczecin. During 5 weeks the area over 600 thousands hectares of forests were covered by almost 400 experimental plots (60-120 ha) with surface over 30 thousands of hectares inclusively, on which the game was counted with driving sense method. For the experiment all forest complexes over 50 ha were taken into considerence. All the experimental plots were chosen by random. The driving sense method used in the experiment was under strict control of scientists from our team, who participated as static observers and as moving observers also. In the situation of appearance more numerous group of animals, we used video cameras to archiving this data and we analyzed the video from the cameras during laboratory works.
Altogether over 5 thousands of red deer and over 4 thousands of wild boar were counted. Density of red deer was varied (since 90 up to about 200 individuals per 1000 hectares) in different parts of RDSF in Szczecin. Density of wild boars was varied also (since 40 up to about 200 individuals in different parts of the RDSF). The density of red deer was connected with the kind of forest environment. The lowest density of red deer was in large complexes of forests with Scots pine as a dominated species in tree stands. On the surface of large forest complexes with higher amount of deciduous tree stands usually the density of the game was higher. The highest density was observed on the areas of mixed and deciduous tree stands, which were a complexes of separated medium and small sized forests in the agricultural landscape. The average level of damages in forests caused by game was comparable. This result prompted us to revise views on acceptable medium density of red deer in the forest environment, depending of kind of forest structure that is bearable for the forest environment. All results were compared to the existing inventory data which was based on year-long observation method and game density shown in the experiment are much higher .

O.HH.06

The views of hunters on the release of farm-reared red-legged partridges in Spain

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KEYWORDS : choice experiment ; conservation conflict ; game management ; in-depth interviews

The need of incorporating socioeconomic aspects in the study of conservation conflicts derived from human activities, such as hunting and its associated management, is increasingly recognized. One of these conflicts involving hunters and conservationists is caused by the release of farm-reared animals to supplement harvesting. In general, massive releases may allow higher harvest and revenues but also jeopardize wild populations due to e.g. the introduction of parasites and pathogens or the erosion of the wild genetic pool. In this study, we explored the views of Spanish hunters and game managers on the release of farm-reared red-legged partridges (*Alectoris rufa*). The use of this technique has exponentially increased over recent decades in Spain as a consequence of the sharp decline suffered by wild partridge populations; currently at least 3-4 million partridges are released annually for shooting (for an overall official hunting bag of 4-5 million birds). Our work was structured in two phases : 1) we performed interviews to game managers in 59 small-game estates in central Spain, the main hunting area in the country. Our sample included managers who had never released partridges, managers who did it only occasionally, and others who employed this technique annually in their estates; 2) we developed a choice experiment to assess the valuation of Spanish hunters (n=632) for hunting wild or farm-reared partridges. Most of the interviewed managers showed negative views toward releases, and these included their detrimental effect on natural population, their low effectiveness, and their consideration as artificial hunting. Very negative views predominated among managers who had never released partridges and those who released partridges occasionally. In contrast, positive views were mostly given by managers who released partridges annually, and generally referred to the economic benefits of releases. Choice experiment results showed that the additional maximum willingness to pay for a walked-up hunting day with an additional harvested wild partridge is ca. 50 euro, whereas hunting an additional farm-reared partridge increases the overall willingness to pay for the day in only 2-3 euros. In other words, a walked-up shooting day was valued more than 10 times better when expecting to hunt one more wild partridge than one more released bird. These findings suggest that the introduction of farmed-reared partridges is a management practice driven by the scarcity of wild ones, rather than by consumer preferences. This, together with the fact that scientific studies have demonstrated that releases are detrimental for wild populations, as acknowledged by most managers, can explain the interest in applying institutional arrangements to reconcile conflicting functions of hunting (i.e. economic and ecological). In this sense, it has been proposed that hunting estates offering wild stocks could be supported through, for example, the implementation of a Game Quality Label. This would favor wild partridge hunters and also benefit natural populations, and probably biodiversity conservation as a whole.

O.HH.07

Game species as motivation for voluntary conservation and biodiversity-oriented management of forests

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KEYWORDS : ecosystem services ; forest owners ; grouse ; METSO programme

The EU strategy to halt the loss of biodiversity and ecosystem services by 2020 requires vigorous national efforts. In Finland, the majority of threatened forest biodiversity lies in south-central parts of the country where approximately 70 % of forest land is owned by family forest owners. Traditional top-down approach to conservation using legal instruments has caused resistance among forest owners.
This challenge has been confronted with a multifaceted Forest Biodiversity Programme METSO. The programme is based on totally voluntary means, and includes active communication between forest owners, forestry advisors and authorities. The ambitious aim is to activate conservation agreements between forest owners and authorities and gain in total 96 000 hectares of permanently protected areas and 82 000 hectares of temporary conservation agreements and nature management by 2020.
According to several independent surveys and on-the-ground experiences in METSO, game species are one of the most important sources of motivation for Finnish forest owners to voluntarily protect and manage valuable forest habitats. While the overall attitude to biodiversity is positive, game provides a more tangible benefit from protection. Grouse, especially the capercaillie (Tetrao urogallus), are particularly highly valued.
In a practical, biodiversity-oriented forest management project funded by METSO, forest owners eagerly participate in planning and implementing new habitat management plans which aim at creating game-friendly forest margins and wetlands. Management includes for instance restoration of peatlands, retaining game cover and food and leaving more retention trees in timber felling areas than required by law. In forest regeneration efforts are made to preserve Bilberry (*Vaccinium myrtillus*) brush and other important undergrowth.
Game is also a good example of an ecosystem service that is easily recognized by forest owners. Organized hunting and wildlife tourism may increase incentives for cooperation among forest owners in protecting game, other biodiversity and important ecosystem services. For managed forests, tailored forest plans with an emphasis on game habitat management could be a new tool to harmonize multiple uses of forests and simultaneously gain significant biodiversity benefits. However, more consultation, training and communication are needed to reconcile the multiple goals of forest owners with safeguarding Finnish forest biodiversity.

O.HH.08

Regional economic effects of visitors in state owned recreational areas in Finland

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KEYWORDS : economic modeling ; monitoring ; nature tourism ; regional economies

Metsähallitus is the administrator of state owned areas in Finland including 3.5 million hectares of managed forests and 4.0 million hectares of conservation areas and wilderness reserves. Annually millions of visits to these areas are being made for various recreational activities such as hiking, fishing and hunting. While travelling, visitors use money for e.g. supplies, food, accommodation and services. This monetary flow creates significant direct and indirect effects to the regional economies which can be estimated using economic modeling techniques.
Reliable data on the regional economic effects is essential for the management authorities for e.g. to show the benefits of budget funding for the decision-makers : the state provides facilities and regional economies get the benefit. The information can also be used to point out the economic effectiveness and benefits of different management actions. The presentation will give an insight to the current estimates of regional economic effects of visitors in state owned areas and the methodology behind numbers.
Metsähallitus estimates annually the local economic effects of national parks (37) and other recreational areas (14). The application for this purpose was developed in cooperation with the Finnish Forest Research Institute in 2009, and is now integrated into the customer database of Metsähallitus. The method is based on a MGM2 model which is was developed for the USDA National Park Service by Michigan State University. The inputs needed are the number of visits and the average expenditure of a visitor, which are being estimated according questionnaires repeated regularly, and multipliers from input-output tables. In 2012, the total income effect of all national park and recreational area visitors was 173.9 million euro and created 2 210 full-time employment equivalents.
Currently there is no specific ongoing monitoring for the economic effects of recreational hunting or fishing. However in 2009, the Ruralia Institute of Helsinki University conducted a case study in eastern Lapland to estimate the regional economic effects that the recreational hunters of small game create when visiting state owned areas. The study was based on questionnaires and interviews of the hunters and local entrepreneurs. According to the results, the 3,500 hunters who bought a small game hunting license in 2008, spent approximately 2.4 million euro in the region during their visits. Using the Computable General Equilibrium model Reg-Fin, created in 1987 by Ruralia institute, it was estimated that the direct impact was multiplied into 5.0 million euro as purchasing power in the region.
Finally the presentation will give an introduction to the ongoing process to develop an application to monitor the regional economic effects of recreational hunting and fishing in all state owned areas. The figures will not be of small importance as the annual total number of hunting and fishing licenses sold by Metsähallitus is ca. 160 000.

O.HH.09

National economy's impact on hunting demand : evidence from Greece

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KEYWORDS : Gross Domestic Product ; hunting demand ; hunting policy

Hunting in Greece is a very ancient human activity, which even now is considered as traditional. Hunting contributes to the growth of national economies. However, little research has been made on the impact of national economies' position on hunting activity. Thus, the aim of the present research is to examine the relation between the national economy welfare and the ability of the citizens to renew their hunting license. Previous researches in Greece have shown that the annual number of hunting licenses is not influenced by their prices but by the fluctuations of the nation's economy. However, those researches are limited to a small time span and only one Greek administrative region. In the present research we test the hypothesis that there is a long-run relationship between hunting licenses and Gross Domestic Product (GDP) in the whole Greece. We use two time series : i) the absolute annual number of hunting licenses, and ii) the annual GDP per capita in US$. The time series cover a time span of 50 years starting in 1962. We use the approach of the AutoRegressive Distributed Lag cointegration, a method suitable for testing such relationships when the time series are short. Such an analysis is useful for the management of hunting activity, since it can provide with information the foresters-managers about the progress of hunting, so that they undertake measures for the development of the activity. The results of this research can be considered valuable for the implementation of sustainable hunting and for the formulation of the relevant policy in Greece.

O.HH.10

Hunting and habitat conservation : evidence from the Republic of Ireland

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KEYWORDS : habitat conservation ; hunting ; Ireland ; rural development

Recreational hunting is frequently considered to be an important tool for the conservation of ecological features in rural areas. However, there remains a limited amount of scientific data on the behaviour of hunters with respect to managing habitats of wildlife value. This paper explores whether hunting activities affect the conservation of habitat and biodiversity in the Republic of Ireland. To unpack this complex relationship, the paper presents the results of a national questionnaire-based survey of hunting organisers and focuses on an upland Red Grouse (Lagopus lagopus) conservation project (managed by Glenfarne Gun Club, North West Ireland) as a case study to exemplify social and ecological best-practice. Overall, the results illustrate that 69 percent of hunting organisers (i.e. gun clubs, driven shoots, hunts and coursing clubs) carried out ecological management practices to improve hunting conditions. The data suggest that hunting in Ireland may play a role in species-specific conservation and support Irish and European Union (EU) rural development goals that promote the multifunctional use of farmland. The paper concludes by situating the findings within a 'sustainable use' conservation discourse and discusses opportunities for hunting and ecological management in the context of EU Common Agricultural Policy reform.

O.HH.11

Managing conflicts of interest about red deer in the Bavarian Alps, Germany

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KEYWORDS : human dimension ; management ; red deer

In Germany, where the right to hunt is tied to landownership, conflicts of interest are frequent. We report about management of a herd of 3500 red deer in the Bavarian Alps, where several stakeholders have vested interests : (1) the farmers who own the right to hunt, who have a tradition of leasing their attractive hunting grounds to generate income, (2) the state forest service, who wants to see limited forest damage to secure the protective qualities of the mountain forests, (3) the people who rent expensive hunting districts for trophy deer hunting. The situation is further complicated in that red deer are fed at winter feeding stations. Often the hunting administration is not able to solve the conflicts of interests following their bureaucratic procedures. We show how progress can be made by employing additional help, using elements of conflict resolution. A specific example will showcase this approach as well as the setting in the Bavarian Alps.

O.HH.12

How to deal with urban wildlife - the case of Baden-Württemberg, Germany

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KEYWORDS : governance ; urban wildlife ; wildlife management

Urban wildlife is a subject of increasing attention, not only in the federal state of Baden-Württemberg (BW), Germany, where our study took place from 2011 to 2013. Employees of municipalities, the forest administration, hunters, veterinarians and other groups seemed to be increasingly confronted with requests from the public regarding urban wildlife interactions. Formerly, on the administrative level, urban wildlife was not considered to be an issue. Hence, the existing governance structures at state and municipal levels are insufficient to deal with this new situation. Consequently, citizens are dissatisfied with the situation, as help from public authorities in the case of wildlife conflicts is not available.
The aim of our study was to assemble an overview of the current situation of urban wildlife and urban wildlife management in BW, as no available data existed. Our main focus was on gamespecies, the negative impacts of urban wildlife, and existing formal and informal management structures to deal with these. The goal was to give recommendations for the establishment of urban wildlife management in Baden-Wuerttemberg (BW).
We conducted twelve qualitative semi-structured interviews with experts from different stakeholder groups to understand the issue. From there, we designed an online-questionnaire for people we considered to be involved in urban wildlife management in BW. 621 Persons from BW fully answered the questionnaire and all counties of the federal state were covered.
The majority of the respondents felt that the amount of requests from the public regarding urban wildlife has risen over the last 20 years. Most requests concern red fox (*Vulpes vulpes*) and beech marten (*Martes foina*), which seem to occur in most housing areas in BW. Badgers (*Meles meles*) and wild boar (*Sus scrofa*) occur only in certain areas, but occasionally in high densities. The negative impacts range from fear of disease-transmission to economic damage to homes and gardens. The occurrence of wild boar seems to be correlated with the boar density outside urban areas and the amount of green space inside. The respondents of the study claim a lack of knowledge of wildlife on the part of urban citizens. Many people of different professions are involved in urban wildlife management on a voluntary basis in BW, but an overall structure or organization is lacking.
In our research project we focused on urban wildlife management and the negative impacts of urban wildlife. But in order to implement effective wildlife management, it is crucial to understand the positive impacts as well. In future studies we will focus on these and take the first steps to implement urban wildlife management in BW.

O.HH.13

Attitudes and perceptions towards conservation success of CAMPFIRE in Zimbabwe

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KEYWORDS : access ; benefits ; conflict ; tradition

The establishment of protected areas had negative consequences on local communities. The shift in conservation resulted in restriction of access to resources, disruption of local culture and economies by tourist hunters in CAMPFIRE districts, increased predation on crops and livestock and displacement of inhabitants. The concept of protected area was introduced to developing countries by colonial administrators and is presently being adopted and promoted by developing nations as commitment to various international conventions. Rapid population growth and change in local community values of wildlife as a resource, shift in land uses, attitudes and patterns of land ownership further make wildlife conservation unfeasible within and outside Protected Areas (PA). The communities adjacent to Hwange National Park (HNP) view wildlife as a liability and have negative attitudes towards it and the Park. The intensity and magnitude of these conflicts are influenced by local people's negative attitudes and perceptions about wildlife. Negative attitudes towards wildlife and consequent land use changes will in the long run threaten the conservation and survival of wildlife outside protected areas, the integrity and viability of the Parks and, the biodiversity they are established to conserve. The different attitudes held may be due to socio-economic factors, levels of interaction between the local communities and HNP and the past experience with the wildlife. The success of wildlife conservation depends on the support of local communities living adjacent to a Park and for community wildlife conservation to succeed an understanding of the attitudes and perceptions of local communities is paramount. It is important to understand attitudes towards wildlife, the Park and important factors that affect these attitudes and perceptions to improve tolerance for wildlife is of major conservation significance. This study sought to (i) determine the effects of selected socio-economic factors (age, sex, level of education, economic activities) and conservation awareness on the attitudes and perceptions of the respondents' towards wildlife and protected area (PA), (ii) effects of wildlife conservation benefits and their associated costs on attitudes and perceptions of respondents' and (iii) if the respondents' attitudes and perceptions is affected by proximity to the Park boundary. One hundred and fifty two households were selected through stratified random sampling and surveyed using questionnaire composed of both open and closed ended questions. Information acquired was triangulated through informal interviews, field observations and focused group discussions. Cross-tabulation using Pearson Chi-square test controlled for selected variables were used to determine differences between independent variables and attitudes. The sex and conservation awareness do not affect respondent attitudes while age, background, economic activities, wildlife benefits accrued and damages, restricted use of wildlife resources and distance from the HNP significantly affected the attitudes. In addition, age significantly affected the perceptions of the benefits accrued from the Park while wildlife damage significantly related to economic activities. It is recommended to consider level of education, economic activities, and age of respondents and increase wildlife benefits to foster community based wildlife management.

O.HH.14

Shifting wildlife value orientations and the effect on wildlife management in the U.S.

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Wildlife management in the United States has become increasingly contentious and challenging. While the foundation of the wildlife profession was rooted in game production and management, prevalent problems today include human wildlife conflict, threat from zoonotic disease, social conflict over appropriate management of wildlife, restrictions on the types of techniques that can be used for management, control of exotic species, and declines in hunting participation. We propose that the growing conflict in wildlife management is rooted in changing public wildlife interests. More specifically, an increasingly modernized lifestyle has led to a shift from domination to mutualism value orientations toward wildlife among Americans. While domination prioritizes human well-being over wildlife and promotes treatment of wildlife in utilitarian terms, mutualism views wildlife as capable of relationships of trust with humans and is defined by a desire for companionship with wildlife. Those with a domination orientation (we call utilitarians) differ considerably from mutualists on desired relationships with wildlife, attitudes toward wildlife policy-related issues, and interest in wildlife associated recreation, especially hunting hunting. In support of this explanation, we show data from a multi-level study in 19 western U.S. states that revealed that there was a strong contextual effect of modernization variables - i.e., differences in wildlife value orientation scoring could be explained by state-level influences of urbanization, income and education. Higher levels of these state-level predictors were associated with higher percentages of mutualists in a state. Moreover, those with a mutualism orientation were less likely to favor traditional wildlife management techniques (e.g., lethal control) and to participate in recreational hunting.

Wildlife professionals are struggling to meet the growing demands of mutualists. Success in this realm will expand political support and might lead to increased funding for management. But this will take considerable more effort than is currently expended as our findings show that mutualists have much lower levels of trust in wildlife agencies than more traditional utilitarian constituents.

O.HH.15

Cognitive and emotional approaches to human dimensions

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This presentation provides an overview of cognitive and emotional approaches to human dimensions (HD) of wildlife research. Much of the initial HD research was exploratory and lacked a clear conceptual foundation. These early empirically-driven studies were predominantly descriptive with limited generalizability. The emergence of the cognitive hierarchy has helped researchers and managers differentiate the range of cognitions that influence human behavior and has provided the conceptual foundation necessary for developing predictive models and generalizing among studies. In this line of research, specific attitudes and norms are theorized to mediate the relationship between general value orientations and specific reported behaviors. These relationships are illustrated using a study of wolves / bears in Abruzzo Lazio and Molise National Park in Italy, and a study of desert tortoises in the United States. Both examples demonstrate that the mediation models can be moderated by the respondents' knowledge of the situation. In general, these cognitive models typically account for about half of the variability in the data. Researchers have recently theorized that emotions might account for the unexplained variability. Data from a study of wolves in the Greater Yellowstone Area in the U.S. are used to illustrate the conditions when emotions are likely to have explanatory power. These cognitive and emotional structural equation models allow researchers to diagram the complex relationships among concepts. The challenge is effectively communicating the meaning of abstract statistics (e.g., beta coefficients). To address this challenge, the presentation introduces the Potential for Conflict Index (PCI2). This statistic integrates into one measure information about central tendency, dispersion, and the shape of a distribution. To facilitate interpretation, PCI2 uses a graphic display and places findings in a managerial context. Data on studies of raccoons, bears, mountain lions, and wolves are used to illustrate how the statistic can facilitate understanding cognitions and emotions. The presentation concludes by offering a mental hierarchy that complements the cognitive hierarchy.

Abstracts
Oral presentations

Impacts Humans > Wildlife

O.HW.01

Translocation as a mountain caribou management tool : population plasticity, the landscape and lesson learned

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KEYWORDS : caribou ; endangered species ; predation risk ; species recovery

There are approximately 1,700 mountain caribou (*Rangifer tarandus caribou*) in British Columbia, Canada. This ecotype is federally designated as Threatened. The Purcells-South (PS) caribou herd in southeastern B.C. is among the most critically endangered as it consists of about 17 individuals. Using an experimental approach, this population was augmented in 2012 with 19 individuals from a larger, more demographically-robust donor herd of woodland caribou from northern B.C. Risk of predation by wolves and especially cougars is a major management concern to both resident and translocated caribou. Using GPS collars we monitored movements of four resident caribou and 19 translocated woodland caribou to ascertain if the latter adopted the predator avoidance strategies of the resident caribou, especially in relation to movements of seven collared cougars. As a control, we compared movements of the translocated caribou to a sample of 16 non-translocated northern caribou from the same donor herd. Using a range of metrics we found that translocated caribou did not adopt resident caribou movement patterns and predator avoidance strategies. Rather, their movement patterns were not sufficiently plastic to avoid significant rates of predation, but remained similar to that of their donor herd. Our findings suggest that mountain caribou herd augmentations use donor caribou with similar life history behaviors as the recipient population, especially those that pertain to the relationship of movement patterns as a predator avoidance strategy.

O.HW.02

Cross country skiing and red deer (Cervus elaphus Linné), in the Eifel National Park

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KEYWORDS : etho-ecology ; participation

In the winter sport area Monschau in the West-Eifel the effects of cross country skiing on red deer are under investigation since the seventies. The pressure on the red deer habitat is determined by mapping all ski trails every winter up to 2012/2013. During the first years ski trails were everywhere. The success of the measures subsequently introduced beginning in the winter 1981/82 to reduce the recreational pressure on the winter habitats of red deer was determined by comparing the winter 1980/81 when the first official cross country ski trails were laid out to the winter of 1986/87. Since 2004 the ski-trails run partly through the Eifel National Park.

The measure to reduce the pressure on wildlife habitat include the following :
- consideration of the location of the winter habitats of red deer
- During the 1980s changes in the trail layout to avoid winter habitats
- Alteration of layout of ski trais from 2006/07 to accommodate the needs of timber-transportion to avoid damaging the ski trails
- the periodical closing of certain forest areas.
- by and large the prohibiting of all hunting in the closed areas
- the fulfilling of complete hunting quotas up to the end of the year before the opening of the ski season
- the cessation of ski patros off established trails
- pushing snow from forest roads only to the minimum amount necessary
- the provision of qualitatively and quantitatively attractive ski trails including comprehensive publik relation work

The disturbance free areas within the habitats increased from 4 % in 1981 to 25 % or 50 % of the total area since 1987 up to the present day, so that on the whole a suitable compromise was found between the legitimate demands of skiers and adequate living conditions for wildlife.
Today the closed areas are accepted by people even if some no skiing signs are missing. People are convinced to taken care with wildlife. The key to success is the participation of all groups and persons concerned.

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O.HW.03

Adaptive behavior of GPS-collared moose against thermal stress detected with airborne laser scanning

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KEYWORDS : airborne laser scanning ; GPS-tracking ; habitat analysis ; Moose

Studies about the adaptation/tolerance of different species to warming temperatures have been conducted on growing numbers. Moose (*Alces alces*) is the largest of the ungulate species occupying the northern latitudes across the globe and in Finland it is the most important game species. It is very well adapted to severe cold temperatures, but has a relatively low tolerance to warmer temperatures. Previous studies have documented changes in habitat use by moose due to high temperatures. In many of these studies the habitats have been classified according to how much thermal cover they were assumed to offer using satellite/aerial imagery data. Here, we identified the structure of habitats used by moose during different thermal conditions by airborne laser scanning (ALS) of the forests around recorded locations of GPS-collared moose. This gave us detailed information about the moose-habitat relations in different thermal conditions and we managed to show 1.) the structure of the used habitats and 2.) how the use of habitats changed according to temperature. We also discovered a threshold above which moose began to adapt its daytime behavior : the search for areas with higher and denser canopies during daytime became evident when average daily temperatures rose over 20?C. This difference was clear when compared to habitat use during lower temperatures. This change was so strong that it provides supporting evidence to the previous studies and suggests that moose is able to adapt its behavior to cope with thermal stress, but also that moose is a species likely to be affected by possibly warming climate.

O.HW.04

Effects of harvest, culture, and climate on size of horn-like structures in trophy ungulates

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KEYWORDS : antlers ; hunting ; management ; trends

In polygynous ungulates, mating success of males is correlated with body size and size of horn-like structures, which are biologically important and are of cultural interest. We evaluated trends in horn and antler size of trophy males recorded from 1900 to 2008 in *Records of North American Big Game*, which comprised >22,000 records among 25 trophy categories of species occupying North America. We used a weight-of-evidence approach based on differences among trophy categories in life-history characteristics, geographic distribution, morphological attributes, and harvest regimes to discriminate among competing hypotheses for explaining trends in horn and antler size of trophy ungulates. These hypotheses were young male age structure caused by intensive harvest of males, genetic change as a result of selective male harvest, a sociological effect, effects of climate, and habitat alteration. Trends in size of horn-like structures were negative and significant for 11 of 17 antlered categories and 3 of 8 horned categories. Mean predicted declines during 1950-2008 were 1.87 and 0.68% for categories of trophy antlers and horns, respectively. Our results were consistent with a harvest-based explanation, whereby harvest of males has gradually shifted age structure towards younger and smaller males. A harvest-induced reduction in age structure can increase the number of males that are harvested prior to attaining peak horn or antler size. Long-term trends in the size of trophy horn-like structures may provide the incentive to evaluate the appropriateness of the current harvest paradigm and pursue further investigations to disentangle the relative effects of nutrition and harvest.

O.HW.05

Moose in the transboundary forests and the role of ecological corridors

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KEYWORDS : damage ; forest ; herbivory ; movements

In the neighbouring countries, Lithuania and Belarus, deer populations conspicuously expand under conditions of climate changes, particularity and differences in forest management that determine changes in the availability of habitats and food supply. There are a plenty research on deer - plant interactions. However, the subject of an importance of ecological corridors for animal movement and selection of immigration - emigration paths depending on conditions required for their existence, is less examined yet. The direct impact of deer species on the forest vegetation changes correspondingly. We aimed to evaluate above mentioned influence considering the role of potential ecological corridors in the transboundary forest ecosystems.
The territorial similarity of the neighbouring countries predisposes animal movement between the certain transboundary territories using some ecological corridors. In order to reveal the impact of deer species on Lithuanian-Belarusian transboundary forests and an importance of potential ecological corridors, I used the integrated method of belt transects (100 x 4 m) and sample plots (50 x 2 m) determining the main forest characteristics of the each route unit. The key species was Moose Alces alces. The main limiting factors of species impact on woody vegetation are the duration of non-vegetative period and its changeability. The long and wintry period causes the increased impact on the natural regeneration and pine plantations because of the clumped distribution of moose. The warm and short periods show the moose concentration in the pine plantations alongside the wet forest sites because of moose thermal sensitivity. We have revealed the potential ecological corridors and their functional aspect for deer species. The appropriate recommendations for forest management of the neighbouring countries have been prepared.

O.HW.06

Evaluation of the hybridization between the domestic cat and the European wildcat in the Walloon region

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KEYWORDS : Felis silvestris catus ; Felis silvestris silvestris ; hybrid ; Walloon region

Nowadays, in Europe, the wildcat is represented by fragmented populations whose genetic integrity is considered to be seriously threatened by crossbreeding with widespread free-ranging domestic cats.
The problem of hybridization of the wildcat (*Felis silvestris silvestris*) with domestic cat (Felis silvestris catus) being highlighted in several neighbouring countries in Europe, we wanted to investigate the situation in Belgium and especially in Wallonia.
Thus, 167 cats with 11 microsatellite loci were genetically analyzed. The programme STRUCTURE clearly identified two distinct genetic cluster corresponding to on the one hand, wildcats and on the other hand, domestic cats. However, 13.17% of the whole sample are considered as hybrids. In total, 80 cats were determined as domestic cats, 65 as wildcats and 22 as hybrids. 17.86% and 7.31% of the cats respectively presumed 'wild' and 'domestic' regarding their phenotypic characters are hybrids.
Significant genetic differentiation (Fst = 0.11, $p<0.001$) between domestic and wild cats suggests that the Walloon population of F. silvestris silvestris has generally maintained its identity and genetic integrity.
Moreover, the study confirmed that the range of wildcat in Wallonia is in progression to the north of its previous range (env. 1850).
Extensive monitoring of genetic integrity of wildcat populations could lead to elaboration of a wildcat conservation action plan (at national and international levels), particularly in areas the most affected by hybridization.

O.HW.07

Hybrid quails restocking practices : a real threat for native common quail populations

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KEYWORDS : Anthropogenic hybridization ; Coturnix coturnix ; hybrid swarm ; introgression

Anthropogenic hybridization resulting from restocking with non-native species for hunting purposes is a widespread practice for Galliformes. This represent a serious threat for common quails *Coturnix coturnix* because genetic studies have indicated that farm-reared birds used for restocking are of hybrid origin, deriving from crosses with the domesticated sister species *Coturnix japonica*, which could lead to the introgression of maladaptive genes into the wild populations. In this study we report the results of trapping and radio-tracking 72 native common quails (16 females and 56 males) and 67 farm-reared quails (51 females and 16 males) during the breeding seasons of 2007-2010.Female hybrids acting as sexual baits in walk-in funnel traps attracted 2.58 times more wild common quail males than pure common quail females (95% C.I.: 1.16-6.87, Chi-square=5.52, 1 d.f., p=0.02). We provide, for the fist time, empirical evidence that common quails and restocked hybrids interbreed in the wild. Moreover, the probability of mating with a wild common quail male was not different for hybrid and common females. Similarly, female origin did not have an effect on nesting success, clutch size, fertility, hatching probability and chicks' survival probability.
On the other hand, nest predation was higher for hybrid females (Chi-square=4.31, 1 d.f., p=0.04), which also suffered higher mortality than common quail females (72.5% vs 31.5 %, Chi-square=17.55, 1 d.f., p<<0.001). These last results would partly help to understand why a hybrid swarm has not been formed yet. However, our results show the lack of reproductive barriers in the wild. Consequently, restocking practices should be carried out with more caution, banning the release of Japanese quails or hybrids and implementing effective procedures to certify the origin of captive-bred quails used for restocking.

O.HW.08

Is home range size a function of forest fragmentation ?

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KEYWORDS : forest fragmentation ; habitat structure ; home range ; old forest

Throughout central Europe Capercaillie populations declined remarkably in the last few decades. Today the species is red listed and many smaller local populations disappeared already or are on the verge of extinction. Habitat loss and habitat degradation due to changes in forestry and other human land-use practices are commonly seen as the major explanations of the species' decline. In particular, the availability of suitable habitat, i.e. of extended old successional forest stages with ground vegetation rich in ericaceous shrubs is believed to limit capercaillie population densities. We therefore started a case study in an area of the Italian Alps characterised by extended, selectively managed montane and subalpine forests and, according to existing knowledge, excellent habitat suitability for capercaillie. We here report on preliminary results on habitat selection and spacing behaviour. Eight birds equipped with 19 g VHF radio-transmitters have been followed throughout the year. To analyse habitat use within individual home ranges a set of forest stand variables were compared between birds' locations and randomly distributed plots. Within home ranges used habitats were not significantly different from availability. This result was consistent among individuals. Annual home ranges (MCP) consisting almost exclusivly of 'suitable'old forest averaged 470 ha in size and were not smaller than those reported from highly fragmented forests in the Bavarian Alps or in Scandinavia. This result indicates that home range sizes of capercaillie are not primarily a function of habitat structure. Also, reproductive success in our study area seems to be comparatively low, despite the overall excellent habitat struture. Other factors, such as predation or tourism, may likely be limiting. So are we wrong, or at least partly wrong, when we believe in forest structure as the best predictor of capercaillie population numbers?

O.HW.09

Road accessibility may reduce effective stopover N2000 habitat area for migratory birds in Greece

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KEYWORDS : habitat suitability ; human disturbance ; Western Greece

Humans and nature values must and can co-exist in densely inhabited regions. Twice a year migratory birds cover trajectories through different regions and continents, passing through urbanized or intensively cultivated areas They face numerous challenges, risks and selective pressures en route. Hence their vulnerability is related to the integrity of resp. migratory routes with adequate suitable stopover opportunities,critical for survival.This is especially true for birds strictly depending on wetland areas. The Balkan peninsula is very important for Palaearctic migratory wetland birds. Greece particularly, extending deep into the Mediterranean Sea forms a bridgehead from and towards Africa. It has some of the largest and most important wetland sites in the Mediterranean Basin but many wetland sites have undergone or are undergoing adverse environmental change due to human activities. About two thirds (63%) of coastal marshes in Greece were lost or degraded in the 20th century. Further areal or quality loss seriously threatens the integrity of migratory routes.

We studied the actual suitability of wetland stopover sites for nine migratory bird species with different habitat requirements in western Greece. High resolution satellite images were used to accurately classify all wetland sites by vegetation classification and by assigning bird habitats based on expert-knowledge. A field campaign was performed during the peak migration of these focal species in April-May 2011 and included validation of site suitability by bird sightings and assessment of mostly human disturbance or proxies thereof for migratory birds.

We specified a particular buffer area around the presence of paved and unpaved roads. There is no empirical basis for specifying any particular buffer width for every disturbance to every bird species. We chose buffers based on our best professional judgment using the auto-ecology and known behaviour of the nine bird species to assign the buffers in a conservative way. The Natura2000 network was developed to reach or sustain a favourable state of conservation (FSC) of designated species and habitats. It is evidently assumed that site area entirely serves this target of FSC. We here establish that effectively suitable and high quality habitat is considerably smaller than reported because of accessibility, in part corroborated by proxies of disturbances. The disturbance effect due to human presence, waste disposal, hunting, poaching following road and track accessibility may cause a considerable reduction in the effective area or quality of stopover habitat of migratory wetland-dependent birds. The actual effect of the presence of roads on bird distribution and integrity of migratory routes is however still a gap in our knowledge and heavily under-evaluated.

The habitat suitability maps we created can be very useful for managers and management bodies to manage the different habitats and to assign priority zones for conservation. There is an urgent need for accurate descriptions of the effective suitability of habitat types, differentiated for particular bird species. Only then can nature values and human activities continue to co-exist.

O.HW.10

Global change effects on badger (Taxidea taxus) distribution in Mexico

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KEYWORDS : badger ; global change ; habitat change ; spatial distribution

The badger or tlalcoyote (*Taxidea taxus*) is a species found from southern Canada to central Mexico. Badger distribution ranges from sea level up to 3660 m. In Mexico it is a protected species by its ecological importance. The badger habitat is destroyed or fragmented at an alarming rate, mainly by land uses change (*roza-tumba-quema*). In addition to all these factors, this species, like the rest of biodiversity, face the global challenge. Our main aim was to assess the global changes effects on badger distribution. Maxent 3.3.1 (Phillips, 2004) models were build, Worldclim (Hijmans et al., 2005) environmental variables were using in A1 and B2 scenarios. Occurrence data were obtained from GBIF (Global Biodiversity Information Facility), CONABIO (National Commission for the Knowledge and Use of Biodiversity) and field work. Spatial changes in habitat distribution were determined by Idrisi CROSSTAB module and by Kappa Index.
The A1 scenario predicts a general increase in temperature and a decrease in precipitation, these variables have an effect on the distribution of the badger habitat, which tends to increase significantly in 2020 and 2080, with a slight decrease in the habitat by 2050. These habitat changes are the result of rapid economic growth, an increase in world population reaches its peak in mid-century and declines since. Assumes rapid introduction of new and more efficient technology to reduce the emission of greenhouse gases, which have a great impact on the species, so the Badger range shows no consistent trend, but if you can consistently identify areas that are affected or favoured by the new climatic conditions.
While the distribution scenario B2 badger habitat tends to increase considerably in the years 2050 and 2080, with a slight decrease in 2020. An increasing population and an intermediate level of economic development, on medium-low emissions of greenhouse gases, in a world where the emphasis is on local solutions for sustainability economic, social and environmental, determine these changes in the habitat of badgers.

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O.HW.11

Selected heavy metals in the liver and kidneys of European beaver from north-eastern Poland

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KEYWORDS : Castor fiber ; copper ; toxic elements ; zinc

Technological and industrial development as well as intensive use of various chemical compounds in agriculture has a serious impact on the environment. One of the main threats are nonessential heavy metals such as cadmium (Cd) and lead (Pb). Heavy metals in general are toxic and may cause hepatotoxity, nephrotoxicity, reproductive disorders and carcinogenic, mutagenic, teratogenic, embriotoxic effects. However, essential heavy metals like copper (Cu) and zinc (Zn) that are present in regular, healthy diet in excess may produce also toxic effects.
Population of European beaver (*Castor fiber*) in Poland is constantly growing and at present it is estimated at 78,000 animals. Such increase can be attributed to the species' adaptability, legal protection and lack of natural enemies. As an herbivore inhabiting both terrestrial and aquatic habitats, the beaver is a good bioindicator of environmental pollution, because of his diet which contains over 200 plant species including plants accumulating heavy metals.
The aim of the present study was to determine the concentrations of Cd, Pb, Cu and Zn in the liver and kidneys of free-living European beaver to estimate the degree of natural environment contamination of Warmia and Mazury region (Poland).
Ten beavers of different age and genders captured in Warmia and Mazury region (north-eastern Poland) in summer of 2012 were used in the present study. The quantitative determination of Cd, Pb, Cu and Zn in the liver and kidneys was determined by atomic absorption spectrometry.
The presence of Cd and Pb was found in all individual samples of liver and kidneys. The mean Cd concentration in kidneys was 2.805 mg/kg and it was significantly higher than in the liver (0.211 mg/kg). The highest Cd content was recorded in both analysed tissues in over two-years old individual (1.435 mg/kg and 14.884 mg/kg, respectively), while the lowest in the youngest animals (ranged from 0.031 mg/kg to 0.048 mg/kg - liver and from 0.015 mg/kg to 0.017 mg/kg-kidneys).The average Pb concentration in all animals was at a similar level in the liver and kidneys (0.076 mg/kg and 0.081 mg/kg, respectively).The mean content of Cu amounted 9.157 mg/kg in the liver and 3.728 mg/kg in kidneys, whereas Zn : 35.702 mg/kg and 21.469 mg/kg, respectively. The highest Cu level was recorded in the livers of two-month-old animals, while Zn in adults.
Our studies shown the presence of analysed metals i.e. Cd, Pb, Cu and Zn in all individual samples of liver and kidneys of the animals. Especially the high level of cadmium was observed in kidneys, while the lead concentration was relatively low. Copper and zinc were at the level considered to be physiological in both analysed tissues. It can be summarized that anthropogenic pollution of heavy metals is present not only in industrialized but also in agricultural regions and in natural ecosystems of Warmia and Mazury as well. Further study should be followed.

O.HW.12

Impact of timber exploitation on western lowland gorilla populations

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KEYWORDS : ecosystem dynamics ; logging ; plant-animal interactions

Timber exploitation is strongly involved in the economic development of countries of the Congo Basin. Nowadays, logging concessions cover around 20% of the total rainforest area and they largely overlap with the natural range of endangered mammal species such as western lowland gorilla (*Gorilla gorilla gorilla*). Timber exploitation impacts on gorilla populations both negatively and positively. On the one hand, logging changes habitat characteristics, and road construction facilitates human access to isolated forests. This phenomenon combined with increased human density associated to logging activities reinforces hunting pressure on forest mammals. On the other hand, the development of herbaceous vegetation (e.g. Marantaceae and Zingiberaceae) due to logging activities (forest canopy opening) may benefit to gorillas, because these herbs constitute important food and nest construction items. Since most of interactions between gorilla populations and timber production are unclear or poorly documented, the present study aims to provide an exhaustive literature review related to those aspects.
The role played by western lowland gorillas in the maintenance of forest structure and composition, and in forest recovery after logging could be essential. In fact, its frugivorous diet, high stomach capacity, ability to swallow large-sized seeds, long gut retention time and long daily travelled distances make this animal species a probable key disperser for numerous plant species. In addition, most ingested seeds are deposited in nest sites that are generally suitable habitats for the development of light-demanding plant species. Thus the preservation of the role of gorilla in forest dynamics could be fundamental in the context of logged forests. Therefore implementation of specific timber harvesting methods that preserve gorilla populations should become a common challenge for forest managers, for both forest maintenance and gorilla conservation.

O.HW.13

Lasting effects of anthropogenic disturbance on the spatial ecology of a recovering leopard population

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KEYWORDS : carnivore ; harvest ; natal dispersal ; socio-spatial organisation

High-harvest can influence the population and spatial ecology of various carnivore species. Following reduction of harvest, the leopard (*Panthera pardus*) population at the edge of the protected Phinda-Mkhuze Complex, South Africa, recovered within four years with demographic parameters matching those of the core, and stabilized afterwards. We used ten years of telemetry data to address the impact of harvest on the dynamics of the spatial ecology of the leopard within this quasi-experimental design framework. We addressed the dynamics of the social organisation in adult leopard within the framework of a dual reproductive strategy hypothesis, and evaluated the density dependence of the natal dispersal patterns in subadults. As the population recovered, females reduced the size of their home-ranges, whereas males reduced the extent of intra-sexual overlap to secure more exclusive access to females. Adult females overlapped more with relatives than with unrelated females, forming matrilineal kin clusters. Female dispersal distance was inversely density-dependent, and all females that settled and bred were philopatric. Two females that started dispersal died before they dispersed beyond one female home-range diameter. Dispersal distance in males was longer and density-dependent. There was no evidence for pre-saturation dispersal, with piecewise regression showing a lag of three years after the implementation of a sustainable harvest protocol for the dispersal distances to increase. After the population stabilized, long-distance dispersal was documented in males and revealed potential linkage between areas currently regarded as distinct conservation units. In this study we show that the disturbance of high-harvest has lasting impact on the social organisation and dispersal patterns, beyond the demographic recovery of the local population.

O.HW.14

Effectiveness of wildlife sanctuaries - assessing ungulate and human occurrence simultaneously with camera traps

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KEYWORDS : disturbance ; human wildlife interactions ; monitoring ; Switzerland

Human recreation activities have increased in the past decades thus raising the pressure on natural habitats of wildlife. Since only few years, detailed information are available that soundly confirm and partly quantify this effect on selected taxa such as wild ungulates and grouse. As such, wildlife sanctuaries and other measures to mitigate disturbance are based on a solid scientific fundament. Nonetheless, we will need concrete information on the effect of wildlife sanctuaries to guarantee the long term acceptance by the public.
In an area of the Swiss pre-alps, we tested a method to monitor the effect of a wildlife sanctuary zone. In particular, we used a camera trap setting to assess human activities on selected trails and the occurrence of wild ungulates on open areas (pastures) adjacent to the trails. In five spatial situations, we placed one camera trap triggered by movements at the trail, each. Additionally, we installed camera traps that triggered by movements but also automatically at an interval of five minutes (Reconyx HC600). With these camera traps, we surveyed open areas adjacent to the trails for the spatiotemporal occurrence of ungulate species.
As expected, ungulate activity close to the trails concentrated during the night and almost all human activities happened during daylight. Also, we observed events of direct interactions between humans and ungulates. Animals left the open area when humans arrived. In one case, the chamois stayed on the open area despite the passing of a pedestrian. With the camera traps, we also detected violations of the legal rules; e.g. dogs off-leash and off the trails. The survey of the open areas was effective during daylight but potential interactions between humans and ungulates during the night may have been missed.
The first results make us confident that comprehensive data on flight distance and the use of open foraging grounds by wild ungulates will be obtained when more situations and longer time periods are covered. On the long run, our camera trap setting thus is an effective method to monitor potential changes in the spatiotemporal behaviour of ungulates in wildlife sanctuaries as a reaction to altered human behaviour. Such information would help to improve the visitor management, to preserve the acceptance in the public and thus to guarantee the long term persistence of protected areas.

O.HW.15

Impacts of human disturbance on the status of Anatolian Chamois (Rupicapra rupicapra asiatica)

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KEYWORDS : Anatolian chamois ; human disturbance ; IUCN ; Population size

Anatolian chamois is the only subspecies of chamois categorized as Data Deficient (DD) by IUCN due to vagueness in population size, distribution and limited number of studies in Turkey. In this study, we aimed at tackling this gap of information by intense surveys carried out between 2002 and 2010 during several conservation projects. To determine the distribution range of chamois, we did carry out direct observations, field trips and meetings with all interest groups and provincial directories of Game and Wildlife Departments. We made an chamois inventory at Kaçkar Mountains in 2010. Four of the five Chamois Wildlife Reserves, located in northeastern region of Turkey and established mainly to protect the subspecies were visited. Bingöl-Seytan Mountains Wildlife Reserve could not be visited due to armed conflict in the area. The entire border between Turkey and Georgia was surveyed from 2003 to 2006 and two National Parks in Georgia were visited in 2010. Using the information collected, we assessed the threat status of Anatolian chamois using internationally approved IUCN criteria.

As a result of these surveys, the Anatolian subspecies was found to occur in the northeastern part in Kaçkar Mountains of the Black Sea, Karçal Mountains near to Georgia, eastern parts of Munzur Mountains at about 1.500 to 3.500 m a.s.l. With this study we have shown that the distribution range of chamois declined sharply in Turkey and specifically became almost extinct in the Ordu, Giresun and Trabzon provinces at the northern and western part of the Eastern Black Sea Mountains and Erzurum and Bayburt provinces at the southern part of the mountains. No individuals could be observed in the Süphan Mountain in 2002. Two main subpopulations were observed to occur in refuge areas among Erzincan, Bingöl and Tunceli provinces, and between Rize and Artvin provinces. However, these pre-connected subpopulations became isolated populations at least for a decade due to human disturbance. Georgian populations mainly were formed by trans-boundary subpopulations (100-150 individuals) including southwestern part of lesser Caucasus Mountains and Karçal Mountains. The last chamois inventory provided chamois population size as about 80 individuals in Artvin. Besides, Rize population was around 150-200 individuals in 2009. So, overall population size was estimated as 330-430 individuals at northeastern part of Turkey except a small population in the Munzur Mountains due to unsustainable and too high trophy hunting quotas and high poaching pressure.

We found main threats acting on chamois populations as : trophy hunting, poaching, habitat fragmentation due to logging new roads to alpine habitats, increasing tourism activities, avalanches, heli-skiing and potential highway constructions at high plateau for mass tourism. Impacts of human disturbances leads to continuing decline in population size, isolation of populations, decrease in group size and chance of mating during courtships, and females without yeanlings probably due to low genetic diversity. In conclusion, Anatolian chamois population have been declining at least for a decade due intensive human disturbances therefore we propose the red list status of the subspecies as Endangered (EN) following IUCN criteria A2(a,b,c); B1b.(i and v); C2a(i).

O.HW.16

Effect of landscape structure and hunting activity on roe deer movement

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KEYWORDS : fragmented landscape ; hunting ; wild ungulate

In Europe agricultural intensification and urbanization have generated substantial spatial heterogeneity and fragmentation of forest habitat. At the same time, some wild ungulate populations have increased both their density and range partly by exploiting the high-quality food resources provided by agricultural activity.
Over the past decade the question of the regulation of these expanding populations has become not only a scientific challenge but also a management issue. A question emerged concerning the potential regulation of these populations by natural or human predators. Traditionally, this regulation role was largely considered in simple numerical terms (number of animals killed by predator), but this vision has recently become more complex. The mere presence of predators has non-lethal effects (increase alertness, change in space use) which leads to changes in the spatial distribution and demography of the prey populations.
In the case of hunting, predation risk is extremely variable in time (seasonal hunting) and space (accessibility by vehicle, visibility of prey), generating a heterogeneous 'landscape of fear' within which animals have to minimize risks by modifying their habitat use and movements.
We studied the trade-off between access to resources and predation risk, by focusing on roe-deer movement in a hunted population. The study site is situated in a farmland landscape southwest of Toulouse (France). We used relocation data acquired at high sampling frequency (every 10 min) to contrast movement characteristics between hunted and non-hunted seasons. We linked movement characteristics and residence time with habitat structure and particularly availability and connectivity of woodland fragments.
Our first hypothesis was that roe deer should decrease movement rate during hunting season. And second, that roe deer should spend more time in and move closer to woodland fragments (assumed to be the safest habitats). Our results support these hypotheses and suggest that roe deer resolve the trade-off between agricultural matrix exploitation and risk avoidance by modifying their movement into its heterogeneous landscape, and especially their use of small woodland fragments.

O.HW.17

Hunting bird species considered to be in an unfavourable conservation state, an EU assessment

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KEYWORDS : birds ; European Union ; hunting ; management

The situation of migratory birds very much depends from the decisions and management measures taken by a wide variety of actors throughout the flyway. The Birds Directive was adopted in 1979 to protect the wild birds throughout the European Union (EU). It established a common legal framework for all EU Member States. Under the Birds Directive Member States have to ensure that the hunting of huntable species does not jeopardise conservation efforts in their distribution area and that it complies with the principles of wise use. The achievement of that objective is more complicated for some species than for others, in particular for those which breed in one part of the EU whereas they are hunted in another one.
Aware of the decline of some huntable species populations the European Commission, in co-ordination with involved parties, decided to develop Management Plans aimed at reversing that trend. Although the EU Management Plans are not legally binding Member States have been encouraged to implement the recommended measures. The European Commission is in the process of assessing on one hand the species population data and on the other hand the level of implementation of the measures listed in the EU Management Plans. First outcomes of the implementation review will be presented at the congress if available on time. When there is continued decline the way forward as regards hunting will need to be carefully thought considering the main causes of decline and the net impact of hunting taking into account possible positive and negative, direct and indirect effects on populations.

Abstracts
Oral presentations

Tools for management and research

O.TL.01

Nematode parasites introduced as tools for management of French deer wild populations

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KEYWORDS : Ashworthius sidemi ; Helminthofauna ; Oesophagostomum sikae ; Trackers

Between 1986 and 1990's Ashworthius sidemi Schulz, 1933 was identified in French Roe deer (*Capreolus capreolus*) and Red deer (*Cervus elaphus*) for the first time in Western Europe. This blood-sucking abomasal nematode is known as a natural parasite of Sika deer, via which it was introduced into many European countries. In Eastern regions, *A. sidemi* passed from Sika deer to Red deer, which distribution range progressively and naturally extended to the West (Russia, Belarus, Ukraine, Poland, and Slovakia), and contaminated autochthonous populations. In contrast, in the Czech Republic and France, Sika deer from Japan were directly introduced by human. The main spread of *A. sidemi* in French deer is the consequence of the great released of animals from Chambord where this parasite was detected in cervids.

We have studied the helminthofauna of abomasum and caecum from Roe deer and Red deer originated from France. Nematodes were identified using morphological features and compared by molecular analysis of ITS2 region of ribosomal DNA. The new results were i) the presence of A. sidemi is observed in Roe deer living in syntopy with Red deer, and ii) the presence of *Oesophagostomum sikae* is concomitant with *A. sidemi i*n Red deer and could be transferred to Roe deer populations.

Thus, following invasive species of parasites, such as Ashworthius sidemi and *Oesophagostomum sikae*, for which the introduction's history of their host Sika deer is well known, represent a good tool to infer contacts and map the social network of deer populations. Moreover we could be able to detect easily and identify the larvae of these two parasites in feces. Hence, we can follow deer populations not only by using necroscopy analysis but also by coprological approach, a less invasive method.

O.TL.02

Preliminary study of pulmonary protostrongyliasis in hares in France : first epidemiological data

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KEYWORDS : intermediate host ; Lepus europaeus ; Protostrongylus sp.

Pulmonary protostrongyliasis of hare is a parasitic disease caused by nematode belonging to the genus Protostrongylus (Nematoda, Protostrongylidae). This lungworm infection is characterized by extensive subpleural lesions (tissue atelectasis and interstitial pneumonia with increased septal thickness) compromising pulmonary function. Hare is infested by ingestion of infective larvae stage 3, released in the field by an intermediate host previously identified as gastropods.
In southeastern France, the prevalence of this lungworm infection seems to have increased in hare (*Lepus europaeus*) populations during the last years. Wildlife managers have started a three years study to assess the importance of the disease and to identify the different species involved in the parasite life cycle.
Brown hares shot by hunters or found dead within the SAGIR network in four southeastern French departments in 2010 were examined for Protostrongylus sp. A pathologic examination was performed on all lungs. The adult worms (male and female) were morphologically identified and characterized by molecular biology (D2 domain of the 28S and ITS2 rDNA). Two different species were identified. One species was only isolated from a hare which was co-parasited by the two parasite species.
In addition 1,455 gastropods were collected in the four same areas during autumn 2012, to identify their implication as potential intermediate hosts. Larvae were isolated from 5 snails and molecular approach showed they are related to one of parasite species found in hares. That is the first time that positive snails are detected as intermediate hosts for Protostrongylids in natural conditions in France. Spatial distribution of the snails might explain the different intensities of the lungworm infection in hares in the prospected areas and in France.
The prevalence of the lungworm in hunted brown hares was 39% (149/381). Macroscopic changes typical for lungworm infection were observed in 76% of positive hares, and the infection was generalized in 33% of them. Although there has been little observation of altered escape behaviour, lungworm infections could deteriorate general condition and could affect the hare's ability to escape predators or even hunters, which could lead to an overestimation of severe infections prevalence.
Financial support provided by the French Game and Wildlife Agency, the French National Hunting Federation and French Departmental Hunting Federations.

O.TL.03

Modelling the impacts of deer management practises on spatial dynamics of ticks

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KEYWORDS : cellular automata ; deer movement ; tick control ; tick population ecology

Deer (e.g. roe deer, red deer and fallow deer) are common host types for European *Ixodes ricinus* ticks. Population and movement patterns of deer can be altered by certain wildlife management practises. Understanding the impacts of such alterations on the spatial dynamics of ticks may advise risk management practises for tick-borne diseases, and thus be of great public health importance, especially for frequent forest visitors.
Predicting the consequences of deer management practises on the spatial dynamics of *I. ricinus* ticks requires a thorough understanding of (i) the potential deer management practises, (ii) the spatially explicit response of deer movement patterns to such management practises and (iii) the spatial ecology of tick-deer relations. A scenario analysis was conducted by integrating multi-disciplinary knowledge in tick population ecology and deer management within a predictive spatial modelling framework. A population-based, multi-host and multi-land cover cellular automata model for I. ricinus population ecology was adapted from a previous modelling study so that it allowed to simulate how changing deer movement patterns can influence the spatial distribution and abundance of ticks in heterogeneous landscapes. Four scenarios on potential and foreseen deer management practises and the corresponding changes of deer movement pattern plausible in Europe were established based on literature and expert knowledge. Those scenarios were then modelled using an artificial landscape.
Our results showed that : (i) controlling local deer population could not effectively reduce both patch- and landscape-level tick abundance if target woodland patches were well-connected for deer population exchanges, (ii) controlling deer browsing in grassland can reduce the tick abundance in grassland, but increase it in woodland, (iii) local extinction of deer could greatly decrease the tick abundance but deer reintroduction could lead to tick upsurge and (iv) controlling human disturbances may increase the tick density at landscape-level but avoid tick 'hotspots' (i.e. areas with extreme high tick density) at woodland patch-level.
In conclusion, we showed how complex ecological models for disease vectors can be adapted for decision support, allowing policy maker to assess the potential effects of managing deer population as tick control strategies. Scenario analysis based on ecological models can help bridge gaps between the management of wildlife and of tick-borne disease risk. It can aid scientists by suggesting possible empirical investigations of disease risk in relation to wildlife management strategies, and help policy-makers to assess the possible public health influences of potential wildlife management strategies. The explicit representation of spatial heterogeneity in our approach allows more realistic scenario setups. However, a better understanding of how biodiversity may influence the ecology of tick and tick-borne disease is required before such simulation studies can be further developed for real world cases.

O.TL.04

Spread of tuberculosis in alpine wildlife populations in Bavaria

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KEYWORDS : bovine tuberculosis ; Germany ; red deer ; zoonosis

Bovine tuberculosis (bTB) is a chronic bacterial disease of cattle that occasionally affects other species of mammals. This disease is a significant zoonosis that can spread to humans. Today wildlife constitutes an important reservoir of bTB. The presence of bTB is a result of spillover from domestic animals combined with anthropogenic factors such as translocation of wildlife, supplemental feeding and population densities beyond normal habitat carrying capacities.
Our main objective was to determine the influence of wildlife ecology and livestock management on the spread of bTB among wildlife and livestock as well as new insights in disease ecology of bTB complex.
On this background we screened wildlife populations of red deer, roe der, chamois, badger, fox and marmot for bTB during the hunting season 2011/12 and 2012/13 in 5 Bavarian alpine counties. Examining 1200 animals we found in 2 of this counties bTB positve wildlife. In Upper Allgäu county 21 of 457 red deer were bTB positive. Analyseing this result we found around the village of Oberstdorf a bTB prevalence in red deer of 10% and in red deer old than 1 year of 17%. In this area we also found one roe deer and one fox bTB positive. Comparing with the other Bavarian counties we found the highest density of wildlife as well as the highest density of free raniging cattle in Upper Allgäu county. Another risk factor might be in winter the very high red deer density at feeding stations in this region. Reducing prevalence rate in red deer as well as infection risk between deer we recommend to sink the red deer population density as well as to limit the number of deer at feeding stations to 50 animals.
The project combined teams of 4 EU countries in the Alpine region and was founded by EMIDA ERA-NET.

O.TL.05

Methodology used for the European badger (Meles meles) monitoring in Wallonia

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KEYWORDS : badger ; count ; monitoring ; population

During the seventies, den gassing has been broadly applied in Belgium to control rabies. The goal was to limit the red fox (*Vulpes vulpes*) population, identified as the main epizootic vector. However, this method deeply affected the European badger (*Meles meles*) population (decrease of 90%). At the end of the eighties, an oral vaccine was successfully used to eradicate the rhabdovirus which helped the badger to restore its population.
Different badger surveys have been performed in Wallonia during the last 30 years. They mainly concerned den inventories. The most recent survey started in 2006 with the support of the 'Service public de Wallonie' : it included different tasks. Between 2006 and 2008, the den atlas has been updated on the Walloon territory with the help of forestry agents and other collaborators : around 1500 setts have been checked and characterized. Though, as it was impossible to have a complete overview, a habitat modelling was elaborated. Based on the badger ecological needs (proximal and direct variables) to build dens, it was designed to assess the part of overlooked setts in the main area of distribution of the badger (southeastern Belgium). The predictive model used consists in calculating the Mahalanobis distance statistic (D^2) which is a presence-only modelling technique allowing to identify den locations. The results indicate that around 22% of the potential dens expected in the study area are not included in the current inventory. This value has been taken into consideration to correct the badger population estimate. Furthermore, different areas that were not comprised in the den inventory of 2006-2008 were recently checked for new badger setts, allowing to validate the model.
Associated with badger counts, these data were used to assess the population level in Wallonia. Counts were organized to define the mean number of individuals occupying a sett, as well as the mean social group size. Between 2007 and 2009, a first selection of 50 setts was used. Since 2010, a new sampling was defined in order to select a den in each area of 80km^2 within the species distribution area. Therefore, the total number of dens considered in Wallonia reached 139. Finally, since 2007, between 24 and 50 dens a year were checked by 3 successful lookouts. The social group size was calculated through the inventory of all additional occupied dens within a home range of around 110 ha, corresponding to the mean average home range size of a social group of badgers in Belgium. During the lookouts, all observed individuals were classified into 3 age categories : adults, subadults and juveniles. Statistical analyses enlightened significant variables explaining badger population changes. After a population decrease recorded in 2009, the population level is statistically stable since four years.

O.TL.06

Does red deer management unit area suit for wild boar in Southern Belgium ?

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KEYWORDS : Cervus elaphus L. ; dispersal ; mark-recovery ; Sus scrofa L.

We analysed the natal dispersal of red deer and wild boar in order to compare their dispersal capabilities in Southern Belgium and to evaluate the relevance of management unit areas (MUA) designed for their monitoring. Dispersal was studied thanks to a mark-recovery method based on 111 red deer fawns and 1613 piglets. The recovery rate of ear-tagged animals was 68 % and 40 %, respectively. In both species, sub-adult males moved on longer distances (red deer = 4.82 +/- 4.17 km and wild boar = 4.90 +- 5.65 km) than females and juveniles (red deer = 1.84 +/- 1.46 km and wild boar = 2.49 +/- 3.74 km). Taking into account the age and sex categories we found no difference between species in dispersal mean distance. But we observed higher maximal dispersal distances in wild boar compared to red deer. The natal home range mean sizes were 5.29 km² (+-4.87) for red deer and 6.23 km² (+-4.60) for wild boar. Red deer and wild boar shown similar dispersal rates according to age and sex category : 53 % and 42 % in subadult males and 14 % and 16 % in females and juveniles. Our results confirmed the higher proportion of philopatry in females and juveniles of both species compared to sub-adult males more likely to disperse. Wild boar of any sex or age seemed to be less sensitive than red deer to infrastructure (road, rail, river) network on which the management unit area limits are currently based.

O.TL.07

Mapping and analysis of wild boar (Sus scrofa) rooting sites in grassland

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KEYWORDS : disturbance ; GIS ; habitat preference

Since 2006, wild Boar occurs in the region of the Zwarte Beek valley, an important peatland area in Flanders, Belgium. The nature reserve houses semi-natural grassland types of high ecological value. Since wild boar rooting occurs, and populations rise, the managers fear floristic changes and possible threats to groundbreeding birds. This exploratory study aims at determining the extent of rooting and the influence of landscape factors on this type of grassland disturbance. Unlike most rooting studies that focus on agricultural land or forests, this study focuses on semi-natural grasslands in a nature reserve.
In the study area the grasslands are managed by grazing and mowing. The vegetation types vary from moist moderately rich grassland over species-rich permanent grassland to acid valley bogs. Rooting patterns were obtained by detailed manual mapping on foot using a Garmin Foretrex® 40 GPS. All rooting sites starting from 0,5m diameter were inventoried. In autumn 2012, each 2-3 weeks a full inventory of all rooting sites in all fields was made. Density and depth of rooting were taken into account. The GPS data were mapped and analysed using ESRI's ArcMap 10.1. The change of rooting density over time is investigated. The influence of vegetation type, vegetation height, presence of animal cover, distance to roads or human habitation, soil characteristics, grazing regime etc. on rooting are analysed to get insight in the preferred foraging habitat.
The obtained knowledge of the rooting patterns should lead to a more effective management of grassland and wild boars in the nature reserve.

O.TL.08

Totfund-kataster Schleswig-Holstein - a system for surveying dead vertebrates in landscapes

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KEYWORDS : deer ; survey ; vertebrate ; wildlife-vehicle-collision

Idea : Railways and roads are a great source of hazard not only for humans but also for wildlife, and wildlife-vehicle collisions are the most frequent cause of death for some species.
In our project we offer an open system to survey all accidents with wildlife - and more : It is also possible to register all animals found dead in the landscape -. For further investigation of the causes of accidents it is necessary to collect exact locations of the accident sites and species involved. In the long run, we collect the data for prevention of accidents. Planning authorities, ecologists, and wildlife biologists can use this data for research and for prevention of accidents involving deer at known deer crossing points.
The fragmentation of landscapes by new and existing roads or railroad tracks and settlements is still expanding. Traffic is also increasing and will be for many years. Meanwhile, collisions with wildlife are a risk for humans life and also play an important role for populations of many wildlife species.
Implementation and Method : In Germany normally hunters will be informed by police if an accident with wildlife happens. All of Germany is divided into hunting districts, and for each district there is a hunter who is responsible. Hunters have a great experience on roadkill, this is of great importance for the project, and for this reason collaboration with hunters is important.
The first phase of the project was a survey of all hunting districts of our project area (Schleswig-Holstein). All hunters received a questionnaire with a map of their district, and were asked to document all places with accidents involving wildlife on this map and in the questionnaire. We requested information about species, age, gender, date and if possible hour of accident, as well as some additional information. For second phase of the project we have developed an internet-based platform using WebGIS for reporting accidents involving wildlife. This system is designed for long term use. More than 9000 roadkills are reported since the program started in May 2011.
Goals : The data generated can be used in many contexts : traffic- and land use planning, prevention of accidents and wildlife research.
In the last ten years the public has become much more aware of the effects of landscape fragmentation from traffic, including its influence on distribution and genetic exchange between populations.
Further perspectives : The architecture of the web system is open for further expansion. Through collaboration in research, public administration of this surveying system can be improved. It is open for all federal states of Germany and in principle could be implemented in any country. For example, data on birds killed by wind energy plants could be collected.
In our project region (Schleswig-Holstein) we use the official basic topographic maps and aerial photos. Since May 2012 an App 'WTK-SH' for Apple(TM) iPhone is available.

O.TL.09

Landscape genetics : A motorway is a barrier for red deer, but not wild boars

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KEYWORDS : Bayesian clustering ; population genetic structure ; road ecology ; sample size effect

While motorways are often assumed to influence the movement behaviour of large mammals, surprisingly, there are few studies that show an influence of these linear structures on the genetic make-up of wild ungulate populations. Here, we analyse the spatial genetic structure of red deer (*Cervus elaphus*) and wild boars (*Sus scrofa*) along a stretch of motorway in the Walloon part of Belgium. Altogether 876 red deer were genotyped at 13 microsatellite loci, and 325 wild boars at 14 loci. In the case of the red deer, different genetic clustering tools identified two genetic subpopulations whose borders matched the motorway well. Conversely, no genetic structure was identified in the case of the wild boar. While telemetry studies seem to confirm that red deer are more affected by motorways then wild boar, the red deer sample size was also much larger than that of the wild boars. We therefore repeated the analysis of genetic structure in the red deer with randomly sub-sampled datasets of decreasing size. The power to detect the genetic structure using clustering methods decreased with decreasing sample size.

O.TL.10

Potential contributions of landscape genetic research to spatially-explicit game management

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KEYWORDS : eco-evolutionary population dynamics ; gene flow ; landscape connectivity ; source-sink dynamics

Landscape genetics is a relatively young and rapidly-growing scientific discipline that combines population genetics, landscape ecology, and spatial analytical tools. The main goals of the field are to identify and explain influences of landscape composition, configuration, and matrix quality on gene flow and genetic population structure. Landscape genetics has tremendous potential for applied game management and conservation, because it can provide information that is challenging or impossible to obtain with other research approaches. However, many wildlife researchers, game managers and policy makers are not familiar with the novel opportunities provided by landscape genetics. In this presentation, I provide an overview of the basic analytical steps involved in landscape genetics, review published landscape genetic applications for game management, and highlight several areas of applied game research and management that could substantially benefit from a landscape genetic research component. Specifically, landscape genetics can a) contribute to wildlife management across broad spatial scales by quantifying realized population connectivity; b) help to identify source-sink dynamics and their underlying causes for improved management of wildlife metapopulation; and c) improve our understanding of eco-evolutionary population dynamics under changing environmental conditions. In addition to these potential future applications of landscape genetics in game research and management, I also point out important pitfalls to avoid, and remaining challenges to be addressed, so that landscape genetics can become better integrated into spatially-explicit game management.

O.TL.11

Genetic analyzes of red deer : applications in management and forensic methods

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KEYWORDS : Cervus elaphus ; exclusion and assignment tests ; microsatellites ; population structure

We applied molecular techniques for the management of the red deer (*Cervus elaphus*) in the southern part of Belgium (Wallonia). A total of 1800 tissue samples were collected during the hunting seasons 2004-2008 and genotyped at 14 microsatellite loci. These data were firstly used to analyse the spatial genetic structure of the red deer population. Different genetic clustering methods subdivided the Belgian red deer population into three subpopulations. Motorways (E411 and E25) were shown to constitute a barrier to the animals' movements and genetic mixing. Secondly, in the context of wildlife forensics, we aimed at characterizing genetically the Belgian red deer population in relation to other European populations. Using the same 14 microsatellites, we genotyped more than 650 deer originating from 10 different countries (DNA or tissue samples were kindly provided by European colleagues). Calculating genetic distances between European populations clearly allowed discriminating between different source populations and the differentiation of Belgian samples from the rest of the dataset. Our database of red deer genetic profiles open up new practical applications for wildlife policing. Red deer is a game species submitted to the regional hunting legislation rules. Two main frauds can be usefully detected thanks to genetics : (1) It is now possible to unequivocally connect an antler trophy with a poached carcass. We present a case study. (2) Hunters need to fulfill a minimum harvest quota (set by the Forestry Administration), or risk legal or regulatory sanctions. In a few cases, dead farm animals (usually old hinds or calves) were presented to Forestry Administration officials in order to avoid penalties. The DNA profiles from these suspicious carcasses have been compared to the reference database and when not autochthonous, the sample could be assigned to other European populations.

O.TL.12

Population structure of wild boars in Slovenia as inferred by microsatellites

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KEYWORDS : genetic diversity ; microsatellites ; Slovenia ; Sus scrofa

Wild boar in Slovenia is native and a very abundant big game species. As in other European countries, during previous centuries populations went through a demographic decline, and in last four decades wild boar populations in Slovenia recovered and are still increasing. There are no genetic data about wild boars in Slovenia, and this research represents the first study of genetic characterization of wild boar populations in Slovenia using eleven tetranucleotide microsatellite loci. Muscle tissue samples of 52 wild boars were collected in regular hunts from four different regions : two in central part of country; one north-east, near the Hungarian border; and other in the littoral. Bayesian cluster analysis implemented in STRUCTURE showed the existence of three different clusters : south-west, central and north-east. The south-west, littoral, cluster was clearly separated, while in central and north-east were admixture of individuals. The last can be supported with previous evidence that wild boars from central part of Slovenia usually present long distance dispersal. Furthermore, factorial correspondence analysis, without a priori information about the geographical origin of the individuals, revealed separation of samples into two major groups, a south-western group and a second one, that includes individuals from central and north-east Slovenia. The fact that animals in littoral part of Slovenia are clearly grouped in separate genetic cluster could be related with data that wild boars in this area are phenotipically different, characterized as ‘small boars’ because of low body weight during the whole life cycle, and probably they were introduced in this part of Slovenia from Italy. In overall sample, total number of 66 alleles was determined across 11 loci, with mean number of 6 alleles per locus. Average observed heterozygosity was 0.65, which is slightly higher than the observed in other European wild boar populations. Observed heterozygosity in littoral cluster was lower, Ho=0.50, while observed heterozygosity in second genetic cluster (central and north-east populations) was 0.72. Analysis of molecular variance (AMOVA) showed that genetic variation was significantly higher within defined groups than among groups.

O.TL.13

Monitoring of waterbirds for Mediterranean wetlands conservation

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KEYWORDS : International Waterbird Census (IWC) ; Mediterranean Wetlands Observatory (MWO) ; waterbird status ; waterbirds trends

Wetlands are among the most degraded and threatened ecosystems in the world. Increasing pressure from human activities has led to their deterioration and loss of biodiversity. Many species of waterbirds depend on these areas : Anatidae, Ardeidae, Charadriidae, Laridae, etc. ducks, herons, waders, gulls, etc. Waterbird's use of these wetlands is a good indicator of their condition. Birds are also used for recreation or as a source of food. Their monitoring ensures that all activities are carried out in a sustainable manner.

The International Waterbird Census (IWC) is an example of a monitoring program for the conservation of wetlands through the implementation of AEWA (African-Eurasian Waterbird Agreement) and the Ramsar Convention. The IWC involves over a hundred countries worldwide. Over 30 million waterbirds are counted each year in mid-January by more than 15,000 volunteers on more than 25,000 wetlands. The IWC greatly contributes to estimate the size and trends of waterbird populations and to assess the importance of individual wetlands sites for waterbirds and the whole biodiversity.

In the Mediterranean region, an IWC Support Programme was initiated to improve the spatial coverage and the overall quality of IWC in the region by creating synergies between existing national and international programmes, developing tools to improve exchange between local, national and international actors, strengthening national networks of observers and by completing the inventory of wetlands of national and international importance.

In 2013, for the first time, IWC results will be analyzed at the scale of theNorth Africato improve the knowledge about wetlands use by waterbirds and size of the wintering waterbird populations within this biogeographic entity.

These IWC results are a major contribution to the work of the Mediterranean Wetlands Observatory (MWO). The MWO has indeed defined indicators based on data from monitoring programmes. These indicators provide summary information on the status and trends of biodiversity in the Mediterranean basin, for policy makers, managers and the general public.

O.TL.14

Habitat use by radio-marked greylag geese (Anser anser) in Bavaria/Germany

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KEYWORDS : breeding and wintering season ; naturalized geese ; telemetry

Since the last decades greylag geese (Anser anser) are settling new places, especially human built lakes in Germany. One of these lakes the 'Altmuehlsee' has been built 25 years ago and turned into the largest breeding area of greylag geese in Northern Bavaria now. That increase of geese leads to several problems in agricultural land and tourism.
These geese are no offspring of wild geese but of geese that have been exposed by humans in the 60s and hence stay in Bavaria the whole year. There is no data what habitat these geese prefer during breeding season and during winter. Therefore we have radio-marked adult greylag geese with GSM and VHF-radio-backpacks in the years 2010 and 2011. GPS-bearings were taken 4 times a day (at 7 and 11 am and 3 and 11 pm and twice the week we took points hourly - Wednesday and Saturday). Using ArcGIS we evaluated the data and found that the geese stay close to their breeding areas (islands) and in the vicinity of the lake when the goslings are not able to fly and do not migrate along the rivers. When the geese can fly they extend their feeding areas to the agricultural areas about 1 km around the lake. In late August the geese leave the Altmuehlsee to their wintering places at rivers (Danube, Lech), and huge lakes with islands (Ismaning, Manching) and to the city of Munich. In their winter habitats the geese use different feeding areas, depending on the place like fields in rural areas and parks in the city of Munich. There are also differences in the sizes of their home ranges and in the distances the geese fly daily to their feeding places.
For Bavaria this data gives us information about the habitat requirements of geese during winter and during breeding season. This helps us to develop adequate strategies to deal with the problems caused by the geese in urban and rural areas, for instance droppings and damages to fields, in particular in view of the increasing geese populations.

O.TL.15

Hunting for the optimal hunt

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KEYWORDS : adaptive management ; pink-footed geese ; population control ; species distribution modeling

The Svalbard breeding population of pink-footed geese winters in Denmark, The Netherlands and Belgium, and Nord-Trøndelag is a central staging area both during spring and autumn. During autumn the geese feed primarily on stubble fields (which does not conflict with agriculture), but in spring they feed on pastures and newly sown cereal fields, to great economic expense to farmers. The agricultural conflict has intensified over time as the pink-footed goose population has increased from c. 20,000 in the 1970s to an unprecedented peak of c. 80,000 in 2011 and as the spring staging period in Nord-Trøndelag has become extended.
In the recently endorsed AEWA adaptive International Species Management Plan for the Svalbard population of the pink-footed goose a stable population target of 60,000 has been agreed in order to reduce conflicts with agriculture and damage to the tundra vegetation in Svalbard. The population target shall be achieved by a better organization of hunting in Denmark and Norway, where the population has an open season.
To reach the stated goal of the AEWA plan, experimental hunting strategies was set up in Nord-Trøndelag to find the optimal hunting method.
At Skogn and Nesset, both local areas in Nord-Trøndelag, the hunting has been organized in 2011 and 2012. At Skogn all hunting is organized through a website 'gasejakt.no', where the hunters reserve fields for hunting on a day to day basic. Through this website it is possible to regulate the hunting by making areas available or unavailable for hunting. At Nesset, the research group has full control of the hunting and only one hunting team has had access in 2011 and 2012.
At Skogn the hunting has been organized with fixed hunting days during the hunting season in 2011 and 2012. At Nesset the hunting method was changed between 2011 and 2012 on an experimental basis. In 2011 the hunt was organized as one or two subsequent hunting days followed by a changeable period of restricted hunting. In 2012 only a single day of hunting followed by three days of hunting-free days were used. The days without hunting were doubled in length when the geese in the area dropped below a threshold.
The effectiveness and response by geese to the different hunting methods was measured by numbers of geese shot and number of geese in the area and their position via a day to day registration during the hunting season. To test that the geese did not leave because of a lack of food the field status in both areas was classified and density of waste grain was counted on stubble fields before, during and after the geese had left the area.
The experiment is carried out in close collaboration with researchers, landowners and hunters, to achieve an optimal hunt which is realistic and satisfies the stakeholders. Further this collaboration is needed to make the adaptive harvest management plan a success. In my presentation I will show preliminary results from the experimental hunting performance.

O.TL.16

Integrated management of invasive geese populations in an international context : a case study

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KEYWORDS : Canada goose ; culling ; invasive alien species ; moult capture

Growing breeding populations of geese exert a negative ecological, economic as well as social impact in Flanders and The Netherlands. These populations include invasive non-native greater Canada goose *Branta canadensis*, native greylag goose *Anser anser*, feral domestic goose *A. anserf. domestica*, mixed populations of wild and domesticated barnacle goose *Branta leucopsis*, as well as a number of non-native species like Egyptian goose *Alopochen aegyptiacus*, bar-headed goose *A. indicus* and magellan goose *Chloephaga picta*. The EU co-funded Interreg IV-A project INVEXO (www.invexo.be) (2009-2012) focused, among others, on the management of native and non-native summering geese. The general aim was to develop an integrated, sustainable management in favour of both biodiversity, agriculture and the recreational sector. The approach combined efforts on prevention with ethical management methods and a clear communication to different the stakeholders and the public. Management measures intervened on reproduction (pricking eggs) and on the number of birds (culling trough moult capturing and shooting). Measures were implemented opportunistically in space and time, resulting in a mixed, diffuse deployment throughout the project area. Limitations in the scientific follow-up did not allow to discern the effectiveness of separate management measures. However, the combined management efforts were closely monitored and their overall impact was assessed by annual counts of the summering geese populations in the region using a fixed sample of counting areas. The census showed greylag goose to be the most common species, followed by greater Canada goose, Egyptian goose, barnacle goose and feral goose. Trends in the average number of geese per municipality and per year were modelled using Generalised Estimating Equations (GEE GLM). The analysis showed a significant decrease in the number of Canada goose since the beginning of the project (2010 versus 2011 and 2012 respectively). It was unclear which population response (e.g. dispersion, reproduction) was responsible for this decline. When the province of east-flanders, where moult captures were applied most intensively, was considered separately, a significant yearly decrease was noted. Moreover, incorporating the number of Canada goose caught with moult captures as a fixed effect in the GEE model, showed a significant effect of caught numbers on modelled estimates. Although suggesting a link between moult captures and population numbers, this approach would assume other management efforts to be evenly applied and distributed over the project area, which was not the case. Moreover, the number of geese in the entire area hardly decreased in the last year of the project. Recent research indicates that Canada geese disperse over large distances within Western Europe, blurring a possibly significant effect of a local action over the years. For other species no trend could be detected. Future work will include dynamic population modelling to estimate the combined effect of management measures, as well as thorough monitoring of geese populations as the basic elements of a sound adaptive management plan for geese in the region. In addition, this approach requires continuous dialogue between partners and stakeholders. In this respect, the Invexo project has provided a strong impulse.

O.TL.17

Population history and connectivity in a northwards expanding carnivore : the Fennoscandian red fox

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KEYWORDS : climate ; game management ; genotyping ; mesopredator

Shifts in species distribution and abundance is one of the most well documented consequences of changes in habitat quality and availability. In particular, the ongoing climate change modifies ecological conditions with an alarming rate by causing a rise in temperature which is followed by profound effects in species distribution and abundance. For temperate species, the amount of available habitat increases which is followed by a population expansion towards the poles as well as local, demographic expansions. Expanding populations of temperate species cause significant effects on species in northern ecosystems through competition, predation and introduction of parasites or diseases. The Fennoscandian red fox (*Vulpes vulpes*) is a habitat generalist species that during the last century has expanded both demographically and geographically as putative responses to a warmer climate, intensified agricultural activities and absence of top predator populations. Expanding red fox populations have become increasingly dominant and negatively impacted on other species in tundra and boreal ecosystems through competition and predation, but may also constitute a risk to humans, wildlife and pets by functioning as a vector introducing new parasites and diseases. Since the ecological consequences of such expansions can be severe, it is important to have a detailed understanding of the factors underlying the process of population expansion. In particular, the historical background as well as contemporary movement patterns needs to be taken into account in order to understand what type of conditions the population was adapted to in the past and how various environmental factors influence the present capacity to disperse and establish in novel habitat types. For this purpose, DNA analysis is the most informative tool since it provides empirical data on connectivity and movement across the landscape, both in past and present time perspectives. We have analyzed mitochondrial DNA sequences and 24 microsatellite loci in modern and historical red foxes throughout the Fennoscandian distribution range with the aim of obtaining a closer understanding of the factors underlying present red fox population structure and ongoing expansion. This talk will focus on (i) identifying in what type of environment red foxes survived the last ice age and how they recolonized Fennoscandia when the ice sheet melted, and (ii) identifying present population structure and movement patterns and the underlying ecological determinants. Results suggest that Fennoscandia was recolonized from several refugia located in different types of environments and today consists of genetically distinct subpopulations that have recently expanded northwards. Based on this, we will discuss how red fox population history has influenced present ecological tolerance and capacity to expand into novel habitats and give recommendations for future red fox management in northern ecosystems.

O.TL.18

Biotic homogenization and hybridization of the red-legged partridge : effects of game management in England

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KEYWORDS : Alectoris rufa ; conservation genetics ; molecular DNA markers ; Phasianidae

Biotic homogenization can be driven by anthropogenic intervention and lead to the gradual replacement of native biotas by expanding invasives. Hybridization between invasive/translocated organisms and representatives of local populations, which often occurs as direct consequence of the homogenization, is a major threat to biodiversity. Introduction of wildlife for game restocking may facilitate both homogenization and hybridization, especially when socio-economic reasons require numbers of birds to shoot that can be provided only by supplementing natural breeding with artificial rearing and large-scale releasing. In these cases management often occurs without regard for genetic similarity or geographic origin of farmed stocks. Red-legged partridge (*Alectoris rufa* : Iberian Peninsula, France and Italy) (RLP) is in such high demand by hunters that commercial stocks of captive-bred individuals constantly supplement natural populations. While homogenization has impoverished spatial diversity, hybridization with the chukar (A. chukar : Greek islands and Middle East to East Asia) (CHK) has undermined genomic integrity of *A. rufa.* First introduced to England from France in 1673, it is thought that RLPs became established only after further releases around 1770. Today, RLPs mostly range from S, SE and E England northwards to Yorkshire and number between 72.000 and 200.000 pairs. From the 1970s, game farms began rearing the chukar and its crosses with A. rufa for subsequent release in UK until the ban of 1992. We investigated *A. rufa* in East Anglia as it could potentially represent an ancient genomic backup for the native yet highly polluted *A. r. rufa* subspecies. We focused on two Norfolk populations (A, B) never subjected to supplementation. We also investigated a third Norfolk population (C) where RLPs have been released. Samples (n = 58 : A, 32; B, 16; C, 10) were investigated at both the Cytochrome-b (Cyt-b) gene of the mtDNA and seven STR (Short Tandem Repeats) loci of the microsatellite DNA. We also used four well-established A. rufa vs. *A. chukar* species-specific Random Amplified Polymorphic DNA (RAPD) markers. While 159 *A. rufa* Cyt-b sequences (all subspecies) available in Pisa were used to provide a phylogenetic context to the introduced-to-UK population, *A. rufa* and *A. chukar* samples (30 each) were used as homogeneous reference for screening potential hybrids using STRs and RAPDs. We found shared haplotypes between English and all native RLPs including French *A. r. rufa.* Although RAPD screening is ongoing, we disclosed 12%, 19% and 30% of A. chukar mtDNA and 47%, 50% and 80% of *A. rufa* x *A. chukar* hybrids using STRs in A, B and C, respectively. For each maternally-introgressed RLP, we sequenced also the Control Region (CR) gene of the mtDNA. We compared joined sequences to Cyt-b + CR dataset available in Pisa for 179 chukars from the entire species' range. We found that pollution affecting English RLPs came from East Asia as has been proved for that disclosed in native RLP populations, a homogeneous origin of *A. chukar* genes made possible through the exchange of genetically unscreened and widely available commercial stocks of captive-bred individuals.

O.TL.19

Ancient and modern DNA for adaptive conservation management of the black francolin (Francolinus francolinus)

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KEYWORDS : adaptive radiation ; control region ; management units ; microsatellite DNA

Thanks to recent advances in molecular biology, application of ancient DNA techniques for the investigation of specimens resident to museums has come to represent an invaluable tool in conservation and evolutionary studies. Novel perspectives are being gained in assessingthe phylogenetic placement of extinct taxa andcharacterizing past populations dynamics. The benefits of such an approach are also evident when dealing with both highly endangered and elusive species or taxa displaying an extremely wide distribution range stretching across politically unstable countries. As case in point, the extent of occurrence of the black francolin (*Francolinus francolinus*, Phasianidae) (BF) ranges from Cyprus across the Middle East and Central Asia to the Indian sub-continent, including six morphologically recognized clinal subspecies. Renowned as valuable game bird since the Classical Age, the BF has always aroused a considerable fascination, yet it remains a scarcely studied species. Nonetheless, hunting pressure and habitat loss are threatening factors raising major conservation concern for this species over most of its distribution range. Regrettably, the demographic trend of the global BF population has never been quantified and a reassessment of its conservation status is needed. Specifically, scarcity of molecular data call for further studies to assess the validity of subspecies and to identify putative management units for purpose of strict protection and sustainable hunting. We aimed at getting a comprehensive insight into the molecular evolution of the species to implement the available ecological data for planning management actions within an adaptive conservation framework. In order to pursue a whole coverage of the species' distribution range, a number of tissues were loaned from properly selected specimens (n = 73) resident to US and European natural history museum collections (toe pads/feathers, mostly dated between 1830 and 1950) to implement the sampling of modern BF representatives (n = 203). Special attention was paid to the islands of Cyprus (unique extant European population) and Sicily (extinct population of uncertain origin). All of the samples were investigated at a 185 bp-long fragment of the mitochondrial DNA Control Region, whereas modern specimens only were also scored at nine STR (Short Tandem Repeats) loci of the microsatellite DNA. Ancient DNA work was carried out in a dedicated laboratory. MtDNA analyses disclosed a well-marked intra-specific genetic structure, the targeted gene fragment conveying a strong phylogenetic signal. Remarkably, the emerging genetic picture was largely but not entirely coherent with the identification of traditional subspecies, being the distinction between the westernmost ones lacking. The partition of the genetic variability was refined by the STR genotyping. Overall, the unveiled phylogeographic pattern further confirmed the westward adaptive radiation of the BF contrasting previous speculations. Our findings clearly point to a Cypriot origin of the historically introduced-to-Sicily BF population, thus strengthening the most credited hypothesis claiming that the introduction was made by people returning from the Cruisades. Interestingly, the Cypriot population showed tight relationships with Turkish BFs, suggesting a likely introduction from Asia Minor to Cyprus.

O.TL.20

Sexual dimorphism of home range size in Red Deer (Cervus elaphus) - does it exist ?

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KEYWORDS : biased inference ; GPS-telemetry ; home range estimators ; space use

Sexual dimorphism is often expressed in different ways within a species, including morphological characteristics (e.g. antlers and bodyweight) or ecological and behavioral traits, such as individual space use and home range size. The latter has been of major interest in wildlife ecology and management for a long time. For red deer (*Cervus elaphus*), a sexual dimorphism with regard to home range size is often mentioned in the literature. However, since various home range estimators are available, observed differences between the sexes could simply be an artifact of the different analytical techniques used to delineate home ranges.
We investigated the existence of a sexual dimorphism in home range size within two red deer populations in Germany. A total of 37 individuals (19 females and 18 males) were equipped with GPS collars in two different study areas in Northern and Southern Germany, respectively. Home range sizes were estimated with minimum convex polygons (MCP), kernel density estimators (KDE) and local convex hulls (LoCoH). Home range sizes were estimated at varying levels, ranging from 5 to 95 % of the relocations available for each individual. Significant differences between male and female home range sizes were accessed by applying a t-test for each estimator and each home range level.
Results suggest that a sexual dimorphism in terms of individual home range size exists for red deer, but strongly depends on the home range level and applied estimator. When home ranges were estimated with MCP and KDE, male and female home ranges were significantly different for the 50 % level and above. In contrast, LoCoH estimation did not show a significant difference between the two sexes until a home range level of 70 % and more of the relocations.
These results highlight the large variance of commonly applied estimators, and show that an ecological interpretation of estimated home range sizes as well as their comparison is challenging. Specifically, the general assumption that male red deer exhibit larger home ranges sizes simply because of greater energetic demands might be flawed. Thus, to understand sexual dimorphism in red deer space use behavior, we recommend to analyze individual movements in relation to biotic and abiotic factors, rather than focusing on home range size alone.

O.TL.21

Spotlight vs. faeces-genotyping : Evaluation of detection-rates

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KEYWORDS : genotyping ; management ; non-invasive ; spotlight-counting

A reliable survey of deer densities, particularly in cover-rich forest areas is difficult. Nocturnal spot light counting during spring time, when meadows are attractive for grazing, is a convenient method to yield a minimum population. Due to a probably considerable number of undetected individuals, absolute population numbers are hard to achieve, but population trends over several years are detectable. Spot light counts can be realized with quite little effort, because local hunters or volunteers can easily be involved.

Older stags seem to be harder detectable on open land in spring. As a consequence stags are obviously underrepresented in the most spot-light-counts, whereas the detection chance of spring groups or herds, consisting of females and young offspring, is much higher.

To evaluate the detection rates of spotlight-counts in a forested area, we combined between 2010 and 2012 this method with a mark-recapture model based, non-invasive faeces-genotyping. The two approx. 10.000 ha large study areas are located in the Palatinate Forest and in the Hunsrueck in South-West-Germany (details on faeces-genotyping approach see Hohmann et al. 2011, Ebert et al. 2011*).

It is shown that the two methods yield very different results. The population densities determined by faeces-genotyping exceed the measurements from the spotlight census results significantly. The result obtained by the spotlight count was 3.7 ha deers/100 ha forest. The population density determined by genotyping is about 7.5 deers/100 ha forest. The coverage rate of the female stock in the spotlight count is about 60 per cent, but only 35 per cent of the stags were detected.

Our investigation of detection rates in spotlight counting, a popular method for deer-density survey, indicates that the sightings can differ considerably from the actual game stock.

*Hohmann et al. (2011) : Calibrating harvest rates. Ungulate management of harvested wild boar and red deer population by using non-invasive population estimates in Germany. XXXth International Union of Game Biologist Congress.

Ebert et al. (2011) : Non-invasive genetic approaches for estimation of ungulate population size : a study on roe deer (Capreolus capreolus) based on faeces <http://abc.museucienciesjournals.cat/volum-35-2-2012-abc/non-invasive-genetic-approaches-for-estimation-of-ungulate-population-size-a-study-on-roe-deer-capreolus-capreolus-based-on-faeces/>. XXXth International Union of Game Biologist Congress.

O.TL.22

Can faecal DNA and capture-recapture modelling yield good population size estimates for wild boar ?

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KEYWORDS : genotyping ; management ; microsatellite ; non-invasive

In order to allow effective management measures for wild boar, reliable population estimates are urgently needed. As an alternative to traditional methods, non-invasive genetic population estimation approaches based on hair or faeces sampling have yielded promising results for several species in terms of feasibility and precision. We developed and applied a non-invasive population estimation approach based on wild boar faeces in two study areas in south western Germany. For study area 1, we genotyped 515 faeces samples that were collected along transects in January 2008. Genotyping was carried out using six microsatellite markers to discriminate between individuals. From 244 successfully analysed samples, 149 individual wild boar were identified of which 36% were detected more than once. Using multimodel inference and model averaging, we obtained estimated population sizes ranging from 235 (199 - 297) to 261 (207 - 366) wild boar. The method presented here offers a tool to calibrate hunting or other management measures for wild boar. However, sample size still is a particularly crucial aspect for this species due to its high abundance in combination with a rather low defecation rate. Using the results of study area 1 and recent data from 2013 for study area 2, we aim to give an evaluation of the feasibility of non-invasive genetic population estimates for wild boar based on faecal DNA and capture-recapture modelling.

O.TL.23

Wild Boar population size estimated by hunting bag genotyping

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KEYWORDS : hunting bag statistics ; microsatellites ; population density ; wild boar

The European Wild Boar is one of our most frequent and widespread ungulate wild animal species. In the light of steadily increasing stocks all over Europe the control of diseases and zoonoses as well as the avoidance of damage in agriculture and specialized crops caused by overpopulation requires improvement of existing management practices especially with regard to present hunting strategies. A fundamental knowledge of population size, density and structure is crucial for their improvement. Common methods like estimation of population size by simple hunting bag statistics can be prone to bias due to age and sex specific hunting and therefore lack accuracy. The advance in animal genetics enables the use of molecular markers, e.g. microsatellites (Simple Sequence Repeats, SSR) or Single Nucleotide Polymorphism (SNP), as a more precise tool for population monitoring. Previous investigations showed that genetic data from invasive and non-invasive studies give congruent results which tend to be more precise than classical hunting bag statistics. Furthermore, revealing the genetic relatedness between hunted individuals gives us information about structure and density of the population in focus. We will present data of a hunting bag SSR genotyping of a wild boar population near Bremervörde, Lower Saxony (Germany) of two consecutive hunting years 2011 and 2012 with about 400 individuals and 12 highly polymorphic SSR markers. The estimation of Maximum Likelihood and Bayesian kinship relation probabilities will be compared to the naive hunting bag statistics. The calculated densities of both methods will be discussed with additional results from a non-invasive study, which has been carried out in the same study area.

O.TL.24

Detection of antibodies against Schmallenberg virus in wild boar, Belgium, 2010-2012

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KEYWORDS : arthrogryposis ; emerging ; midges ; orthobunyavirus

In the summer/fall of 2011, a nonspecific febrile syndrome characterized by hyperthermia and drop in milk production with occasional reports of watery diarrhea and abortion was reported among dairy cows on farms in northwestern Europe. Further, in November 2011, an enzootic outbreak of malformed neonates emerged in several European countries, with stillbirth and birth at term of lambs, kids and calves with neurological signs or malformations of the head, spine, or limbs. Both syndromes were associated with the presence in the blood (adults) or in the central nervous system (newborns) of a new Sathuperi-like orthobunyavirus, provisionally named Schmallenberg virus (SBV) after the town in Germany where the first positive clinical samples were identified. Defining as precisely as possible the host range of the newcomer is a key point to predict the outcome of the emergence of SBV disease in Europe. In this respect, it must be pointed out that orthobunyaviruses infect more animal species than those in which the foetus is damaged. Recently, serological evidence for SBV infection in wild ruminant species (*Cervus elaphus and Capreolus capreolus*) was reported. In the present study, the objective was to seek after serological evidence of SBV infection among wild boar living in a geographical area where exposure to infected insect vectors was high in 2011, as judged from the high seroprevalence reported among cattle in that region. About 700 wild boar were sampled during the 2010-2012 hunting seasons. All serum samples collected during fall 2010 were seronegative. On the contrary, apparent seroprevalence among wild boars in 2011 was ~27% and started to decline in 2012 (~11%). Acquired immunity against the new virus was thus already very high in the wild boar populations sampled in fall 2011, suggesting that the new virus had quickly spread throughout the region since its emergence about 250 km northeast in late summer 2011. The drop in seroprevalence recorded in 2012 suggests that the number of infected vectors in the investigated regions was lower than in 2011.

O.TL.25

Reproducible Home Ranges : a new R package for analyzing wildlife telemetry data

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KEYWORDS : GPS data ; graphical user interface (GUI) ; reporting results ; reproducible research

The estimation of home ranges is one of the most widely used approaches for analyzing radio tracking data in wildlife biology. Several software products and extensions for Geographic Information Systems (GIS) are available to estimate home ranges with various methods. However, current software solutions are often closed source or require programming skills. Furthermore home range studies have been criticized for frequently skipping important analytical steps and for reporting insufficient details on specific parameter settings used during analyses.
In line with recent calls for more open source software in science to achieve full reproducibility, we present a new package for the statistical platform R that allows wildlife biologist and managers to conduct completely reproducible home range analysis. The package rhr requires minimal interaction with R's command line interface, as all analytical steps can be called through a convenient graphical user interface. The package has the functionality to calculate site fidelity, time to statistical independence, home range asymptotes, core area estimation and several of the most commonly used home range estimators (minimum convex polygon, kernel density estimation and local convex hull). After each analysis the application produces a report containing results from the current analysis and all parameter values used. With this report, results from any study can accurately be evaluated by other researchers and managers, and it is possible to reproduce the results at any given time in the future.

O.TL.26

The use of temperature sensors in wildlife research

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KEYWORDS : behaviour ; temperature ; wildlife telemetry

Nowadays, wildlife research is quickly moving from animals monitored by one single sensor, usually a GPS receiver, to animals monitored by multiple, integrated sensors that register spatial (i.e. GPS positions) and non-spatial measurements like acceleration or temperature. An overview is given how these temperature data can be useful to answer questions of wildlife research and management.
Intra-corporal sensors provide continuous and high-resolution information on the body temperature of the animal. Despite the risk and the high methodological effort in implanting them, these intra-corporal sensors are really essential to study short-term or seasonal thermoregulatory behaviour or energy metabolism in wildlife under natural conditions (especially to get detailed insight into hibernation or species specific energy-saving strategies).
Extra-corporal temperature sensors (often integrated within regular GPS devices) provide information on the ambient temperature of the animal. Although data from these extra-corporal sensors are affected by the radiation of the sun and the heat of the animals body, they provide high-resolution information about individual thermoregulatory behaviours (i.e. active cooling or sunbathing) and about the ambient temperature of the animal
These continuous information about ambient temperature of the animal can be related to the spatial position of the animal and give new opportunity to answer questions that connect temporal-spatial behaviour of wildlife with climate.

O.TL.27

Knowing what animals do - linking acceleration data and deer behavior

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KEYWORDS : activity ; behavior detection ; Roe deer

Modern animal-borne telemetry systems can provide researchers with a huge amount of sensory data. Among the commonly used GPS-locations, these may be data of environmental conditions, data of animal's physiological status or data about the animal's activity. The latter is usually measured by a multi-dimensional acceleration sensor. This sensor measures the acceleration produced by the earth's gravitational field, as well as all movements of the sensor that are characterized by a change in velocity. After calibration with the behavioral repertoire of a species, the remote detection of an animal's behavior can be derived temporally and (in combination with GPS information) spatially from the acceleration data.
We tested the suitability of acceleration data for remote behavior detection of roe deer (*Capreolus capreolus*). The roe deer studied were equipped with collars (E-obs, Munich) that measure GPS locations and acceleration at user-defined intervals. In this study, acceleration data was recorded every minute, for a period of nine seconds with a frequency of ten hertz. To calibrate behavior with acceleration data, ten collared deer were observed in winter 2011/12 and 2012/13 in the wild. The observed behavior was documented in the field by video recordings and later associated with the acceleration data. Deer behavior was coded at different resolutions. At the lowest resolution, 'passive', 'moving', 'browsing' and 'other' behavior was differentiated whereas more detailed behavioral classes were differentiated at higher resolutions. Behavior classification and validation was done with CART algorithms. For each behavioral level, a classification tree was developed. The models classified up to 96% of the actual behavior correctly. Especially browsing and passive behavior could be classified accurately (usually within a 2% error).

O.TL.28

Satellite radio tracking of Eurasian woodcock Scolopax rusticola wintering in Italy : first data

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KEYWORDS : breeding ; migration ; movements

Eurasian Woodcock is a very popular huntable species in Europe, especially in the Mediterranean Countries. For this reason, information on the biological, demographical and habitat conditions is urgently needed for proper management of the species. The European Management Plan for Woodcocks provides that the State Members of the European Union shall develop studies on the woodcock population, as well as on its habitat conservation. Hunters associations are expected to participate in the conservation program of this species, by supporting it with a monitoring service. In 2011, an agreement between the University of Padova - Biology Department, Veneto Agricoltura (Veneto Region Agency) and Amici di Scolopax Association, in cooperation with the Federazione Italiana della Caccia (FIDC), started a research program on woodcocks through the use of PTT satellite transmitters, in order to integrate knowledge of the woodcock population wintering in Italy. The aim of this study is to identify breeding areas, migration strategies and phenologies, site fidelities, as well as breeding habits and local movement patterns throughout the winter. In our opinion, the information resulting from ring data is, at the moment, incomplete. This is due to the low number of ringed birds in Italy, the different ways in which the birds are ringed and the variations in recovery efforts throughout the breeding areas. In 2011, 1 bird was equipped with a radio transmitter. In 2012, 6 additional birds were provided with transmitters and in 2013, a set of 8 subjects were added to the program. The capture method takes place at night, with use of a helmet light and a landing net in foraging areas such as grasslands, located near woods. A univocal radio transmitter (weight of 9.5 g, with 2 solar cells that charge the internal battery), is fixed a backpack type and then placed on the dorsal part of the subject, at the level of its scapular line. In this way, the weight force of the apparatus falls in the bird's barycentric area, without interfering with the balance functions related to flight dynamics. No functional obstacle, due to the type of device used on the bird, has been detected during these three years of activity. After the capture of a bird, the installation of the equipment can be complete in 15 minutes. Then the subject is inspected to determine the minimum parameters (weight, class, age) and its overall state of health. The sex identification is determined by DNA analysis. Handling operations are reduced to a minimum, so as not to inflict any undue stress upon the animal. During our first year of study, a single individual has been installed with a transmitter device, i.e. Veneto 1, which reached Belorussia on April 10, 2011 and returned to the original capture area on Dec. 12, 2011. At present, this subject is no longer transmitting a signal. Our knowledge has been improved by the information provided by the additional 6 birds equipped in 2012 : 2 have occupied nuptial areas located beyond the Urals, 4 have returned to Italy and 3 are still transmitting information on a regular basis. We hope our 2013 data will allow us to confirm our hypotheses on : the breeding areas located both east and west of the Urals, both pre and post nuptial migration strategies, wintering, site fidelities and movements during wintering.

O.TL.29

Gamebird releasing in UK based on 50 years of the GWCT National Gamebag Census

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KEYWORDS : long-term trend ; mallard ; partridge ; pheasant

Traditionally, gamebird releasing began as insurance against the negative impact of weather on the production of wild game. Many small shoots continue to release for this reason, even though many other shoots are now entirely dependent on releasing. Since 1961, the Game & Wildlife Conservation Trust (GWCT) and its predecessors have collected national statistics from UK shoots on the numbers of gamebirds released and shot. We now have available a full 50-year span of data to explore how releasing and the returns from releasing have changed over time for pheasant *Phasianus colchicus*, red-legged partridge *Alectoris rufa*, grey partridge *Perdix perdix* and mallard *Anas platyrhynchos*. Releases of pheasants began before 1961, and over the last 50 years have increased nine-fold. Pheasant bags increased correspondingly up to 1990, but increased little since. By contrast, few shoots released red-legged partridges before 1961; since that year releases have increased nearly 200 times and bag sizes have largely matched the magnitude of these releases. The situation for grey partridge is different again. Releasing peaked in the 1990s, but the amount is now only twice as high as in 1961, and bags mainly reflect the productivity of wild birds. Finally, releases of mallards increased during the 1980s and 1990s, and then fell back; bags have broadly followed the same pattern. Looking explicitly at the rates of return from releasing for the two main released gamebirds, pheasants and red-legged partridges, rates were high and variable during the first 25 years, reflecting the large and varying contribution made to the bag by wild birds. From 1986 onwards, the annual variations in return rate for both species had largely disappeared, indicating that the contribution of wild production to the bag was minimal owing to declines in wild stocks due primarily to agricultural intensification. By 2011, the return rate was 39% for both species.

O.TL.30

Regulatory mechanisms of hunting pressure in red-legged partridge : how to optimize decision-making

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KEYWORDS : Alectoris rufa ; game management ; harvest ; Spain

The red-legged partridge (*Alectoris rufa*) is the main small-game species in Spain, where several million partridges are harvested every year. Spanish partridge populations have markedly declined over recent decades, mainly as a consequence of changes in agricultural practices and overhunting. Thereby, game managers have increasingly developed different management measures to boost wild partridge populations and harvest, including mechanisms to regulate hunting pressure. Despite their potential importance to allow sustainability of partridge hunting, regulatory mechanisms have received little attention in the literature in comparison to other management activities. Our main goal was to look for potential ways to optimize harvesting decision-making by game managers. For this, we : i) describe the main regulatory mechanisms of hunting pressure used in central Spain, one of the main regions for small-game hunting in the Iberian Peninsula; ii) assess the relationship between harvest and these regulatory mechanisms; iii) evaluate the most cost-efficient method to estimate partridge abundance, since it is important to set hunting pressure as a function of partridge availability. The general decision-making process and the main regulatory mechanisms were explored through focus groups and telephonic interviews with game managers (~20). Additionally, we interviewed 59 managers to obtain quantitative data on red-legged partridge annual harvest and the main regulatory mechanisms of hunting pressure in their estates (i.e. number of hunters/day, number of hunting days, hunting quotas per day/year, etc). In a sample of these estates (~35), we also surveyed partridge abundance in summer through different survey methods (see below). We modelled the harvest in each estate according to different regulatory mechanisms of hunting pressure and partridge availability with GLMs and selected models with lowest AICc. Finally, we used point-count methods and Distance Sampling estimates as the reference method to estimate partridge density, and compared these estimates to those obtained with several commonly used survey methods, such as Kilometric Abundance Index (KAI) or the number of partridge broods per point. Game managers use regulatory mechanisms of hunting pressure, such as limiting the number of hunting days, the number of hunters per day, the number of partridges harvested per hunter, or limiting certain hunting modalities. The variables that most affected annual harvest in preliminary models were number of driven-shooting days, and number of hunters per day of walked-up shooting per km^2, in addition of partridge availability. Most indirect abundance indices were significantly related to the reference method, but the confidence limits largely varied among methods. We discuss which of these methods could be most efficiently used by managers to accurately estimate partridge density (i.e. availability), and therefore to decide the regulatory mechanisms they want to use in the estate. Our findings indicate that regulatory mechanisms are potentially powerful tools to develop sustainable hunting systems and therefore favour the conservation of wild partridge populations, and they allow identifying the best tools to achieve this goal.

O.TL.31

Zonation - A multi-approach tool for conservation planning, the capercaillie as the focal species

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KEYWORDS : connectivity ; forest inventories ; game management ; large-scale approach

Zonation is a framework and software for spatial conservation prioritization; it is a decision support tool for conservation planning. Zonation identifies areas important for retaining habitat quality and connectivity for multiple species, indirectly aiming at species' long-term persistence. Zonation can link species distribution modeling directly to quantitative reserve planning. Zonation includes species-specific connectivity responses, natural weighting of species and several unique analysis options. It can analyze relatively large data sets in reasonable time. The analysis is deterministic and its main results can be summarized in a map and a graph. You may download the free software from the web pages of University of Helsinki : http://www.helsinki.fi/bioscience/consplan. The package includes user manual and tutorial.

Using Zonation, and spatial data on Finnish forests, we present a fast and relatively simple way to objectively prioritize large areas for our focal species, the capercaillie Tetrao urogallus.We constructed the capercaillie lekking landscape prioritization using published knowledge on the species' habitat and connectivity requirements, and validated the results via comparison to capercaillie lekking-site data. The results show that connectivity considerations both at the home range and the population scale are essential in prioritization of areas suitable for capercaillie lekking sites. In addition, inclusion of negative connectivity to agri-urban areas further enhances the congruence between the known lekking sites and the areas of high priority (48.7% of known leks falling into the best 20% priority category). We conclude that our approach can be used in several stages of spatial wildlife conservation planning : as a preliminary analysis to find areas subjected to more detailed inventories and modeling, in combination with other analytical tools, or as the main instrument enabling informative use of readily available data in operational large-scale land-use planning. The advantages of our approach include : 1) the ability to execute relatively simple and objective analyses covering wide spatial extents at a high resolution, 2) the possibility to incorporate several ecologically realistic species-specific connectivity components into the analyses, and 3) the potential to help managers target wildlife surveys or conservation and management operations.

According to the yearly wildlife triangle counts performed in Finland, areas of high capercaillie abundance roughly coincide with the areas we identified as high priority for capercaillie. It is interesting that our high priority areas also, at least partially, coincide with the proposed 'forest bridges' or greenbelts, aiming at guaranteeing connectivity of Finnish forests (and forest fauna) towards forests of Russia. We have presented one possible solution of how to objectively prioritize important areas for capercaillie lekking sites over large spatial extents. Moreover, by comparing the prioritization output to lekking-site data, we have shown that elements such as home-range and population-scale connectivity are essential in achieving a sensible prioritization outcome. Spatial conservation prioritization can be useful in finding the most important areas for wildlife conservation. Also the low-priority end of the priority ranking can be of operational value : targeting intensive forestry and other environmentally damaging activities to the low-rank areas would facilitate ecological impact avoidance, in this case from the perspective of the capercaillie.

O.TL.32

Modeling both individuals distribution and sampling processes : a powerful tool to define monitoring programs

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KEYWORDS : populaiton abundan ce ; power ; precision ; simulation

Assessing time variations in population size is of great concern for wildlife biologists, particularly to define optimal management strategies of game species. Sampling procedures are often used to obtain an estimate of the population size as well as a measure of uncertainty about this estimate (arising from both sampling and observation errors). Within each year, the mean population size is estimated from the numbers of individuals counted (e.g., along transects) repeatedly (e.g., during several nights) on a limited number of spatial sampling units. Thus, a scientist interested in designing a monitoring program will have to answer the following questions : how many sampling units, of which size, how many nights, etc… to get estimates of population size sufficiently precise to be able to detect a significant year-to-year variation in population size. The aim of this study is to provide a methodology, using computer simulations and some specific field data collected in a pre-study, to help wildlife biologists reaching this goal. Indeed, answering these questions using only field data can not be achieved in practice due to the large amount of data required. We propose to use a state-space modeling approach allowing to jointly define a state process and a sampling process. The state process describes the spatial distribution (e.g., random or aggregated) of the individuals and the sampling process describes the main mechanisms involved in gathering abundance data (e.g., sampling and observation errors, observers effects). Both processes are parameterized using spatially explicit abundance data (location of the observations) collected by several observers (estimation of observer-specific detection functions). Using this model, we can simulate (Monte Carlo) count data collected according to different schemes, e.g., varying number of spatial units, varying number of temporal replicates (e.g., nights), low vs high density context, observer variability. This allows to perform a power analysis and to compare the ratio cost/efficiency of different sampling strategies with regard to the specificities of the studied species and of the studied population/area. We exemplify our approach using spotlight count data collected in a pre-study in France to design a monitoring program of Brown hare (*Lepus Europaeus*) populations. The methodology presented in this study can be used in a wide variety of species and contexts and we encourage game biologists to rely on such an approach to design monitoring programs.

O.TL.33

Talking to wild boars - an acoustic device to prevent wild boar damage in farmland

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KEYWORDS : acoustic repellent ; crop protection ; deterrent ; Sus scrofa

In many regions of Europe, wild boar numbers have strongly increased during the past decades. The amount of damage these animals cause in agriculture increases with population size. Various methods are applied to protect farmland from wild boar intrusion. The methods that have been shown to be efficient, like fences and scaring by shooting single individuals at potential damage sites, are both time consuming and expensive. The demand for an easily applicable repellent method that protects agricultural fields is high. However, olfactory, gustatory, visual and acoustic repellent methods are effective only in the short term, because wild boars have a high learning ability and adapt fast. I propose a new acoustic device that should not lose its effectiveness and repel wild boars efficiently over time. Wild boars use different sounds to communicate between each other. In case of danger they produce scare, warning, and alarm sounds. These sounds can be used to chase wild boars away and keep them far from specific perimeters. The species-specific sounds are played in random intervals together with nonspecific sounds that are related to potential danger for wild boars. Preliminary results of first tests are promising and suggest the efficiency of the device. In the future a combination of prevention methods may reinforce their effectiveness. Focusing only on damage prevention will not solve all the problems we face with wild boars; however, it should be an integral part of a sustainable wild boar management. The new acoustic device may assist wild boar management as an additional and flexible tool.

O.TL.34

Combining harvest data with demographic model to improve the management of red deer populations

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KEYWORDS : Cervus elaphus ; hunting ; matrix model ; quotas

In the context of numerical and geographic expansion of wild ungulates combined with the decrease of hunting pressure, managers need efficient tools to improve hunting and population control. Currently, most managers rely on census methods, known to have poor accuracy, to set hunting quotas. In most cases, biological knowledge about the population dynamics is seldom considered despite its potential importance for management policies. We suggest to combine detailed information from a long-term monitoring of a red deer population with hunting data and an abundance index to predict better past and future populations trajectories. We first developed an age-structured matrix model incorporating harvest data to predict population evolution and improve future hunting quotas. We used longitudinal observation of marked animals of the La Petite Pierre red deer population (France) along with harvest data on the same site to parametrize the matrix model. Natural survival of females varied with age (fawns = 0.92 / yearlings = 0.85 / adults = 0.87) but was found constant among years whereas pregnancy rate of yearlings and adults varied with year according to population density from 5 to 79°% (yearlings) and 80 to 94°% (adults). We then backcasted past population trajectories, using abundance estimation from spotlight counts, to force simulations within biologically realistic boundaries. The observed population growth rate since 1978 was +13.3°%. Our really good knowledge about the temporal variability of demographic rates in large herbivore populations allowed us to make reasonable assumptions about adult survival and reproduction rates. Finally, we used these results to assess the efficiency of different scenarii of hunting quotas to control or to decrease population size. For instance, the removal of 54 fawns and 25 adult females lead to the same population growth rate (-8.9°%) as the removal of 40 fawns and 31 females.

O.TL.35

Hunting records and mandible collection as tools for monitoring red deer population in Southern Belgium

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KEYWORDS : census ; cohort analysis ; population dynamic ; shooting plan

Red deer (*Cervus elaphus* L.) are only present in the southern part of Belgium (Wallonia) and are submitted to a legal shooting plan since 1989. Each culled animal is mandatorily tagged with an official bracelet and controlled by a Forestry Administration official, who completes a cull or mortality form for each culled or dead recovered red deer. Since 1995, these forms (between 3000 to 6000 per year) have been recorded by each Forest District in a centralized database accessible to all Forest Districts of Wallonia. This database is used to generate a number of annually summary reports but is also used to make long term data analyses on population dynamics. Until recently, the computation of the shooting plans was based on population estimates obtained by census, hunting statistics of previous hunting seasons and the need to decrease, increase or maintain the population level. But despite increasing culls, the deer populations continued to grow up. On a quite isolated study area of 14000 ha of forest, mandibles of all dead animal collected since 2000 were aged. The number of calves born a few years before was calculated by cohort analysis and compared with the realized culls. It demonstrated that although the culling plan was supposed to reduce the deer populations, it was lower than the recruitment and it showed furthermore that the usual census techniques underestimated the population by 10 to 30 %. As a consequence, standardized spotlight counts have been gradually implemented in Wallonia and are now widely used as a tool to monitor the trend of the population. The population size of 46 Deer Management Units (DMU) could then be accurately assessed by using the cull statistics of the hunting seasons (2009-2011) and the population trends obtained by standardized spotlight counts. This method could be considered as a useful tool for the establishment of quantitative shooting plans.

Finally, the cull data analyses provide useful information concerning the evolution of structure parameters like sex and age classes ratios at different levels (Forest District, DMU and Wallonia) and are a helpful tool for a qualitative and structural monitoring of the red deer populations. Some examples will be provided.

O.TL.36

A comprehensive annual monitoring program for ungulates with dynamic life histories

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KEYWORDS : integrated models ; mule deer ; population dynamics ; survey methods

Like many ungulates, monitoring mule deer (*Odocoileus hemionus*) populations is a difficult task given large fluctuations in population size and vital rates. To add to this uncertainty, survey methodology is constantly challenged by mule deer behavior, even after extensive work on visibility bias models by several researchers. Idaho has recently altered its mule deer monitoring program largely because age ratios and trend counts produced biologically unlikely estimates of population growth or decline. The new monitoring approach has emphasized standardization and sampling across newly delineated population management units (PMU) that are based on true interbreeding populations. Aerial abundance surveys will act as initial population size and check points of modeled population size. These surveys are comprehensive, conducted in February, when deer are most likely to be concentrated on winter range, and corrected for visibility bias with sightability models. In the interim between surveys, annual population size and structure will be estimated from population models driven by : a starting known population from the most recent comprehensive survey, summer-fall fawn survival measured by December age ratio surveys, fall hunter harvest, and finally by winter fawn and adult female survival. An integrated population model combines these various data types of varying quality and precision in a Bayesian framework. Additional information, such as weather, climate or habitat conditions across population management units can also be integrated into this monitoring system. The program, as now implemented, will cost approximately the same as the traditional trend and age ratio surveys, but with a higher probability of success in predicting mule deer population dynamics.

O.TL.37

The difficulty of implementing the spotlight counts of red deer as abundance indicator

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KEYWORDS : adaptive management ; Belgium ; indicator of ecological change ; monitoring

The spotlight counts are widely used in Belgium for red deer monitoring in order to compute culling plans. They are mainly used as census method to estimate the populations but are known to be biased and to underestimate the true density. Since 2010 this method is progressively adapted into an individual abundance indicator (Garel et al 2010) that aims to monitor temporal changes in the population (Morellet et al 2007). The spotlight counts are standardised to meet the conditions of application and the method is extended to the full distribution range of red deer.
The main faced difficulties are :
(1) make the principle of an abundance indicator comprehensible and acceptable : (1a) understand that the indicator based on a sample may not be considered as a census and (1b) avoid to estimate the probability of detection of the individuals to derive a density ;
(2) properly implement the indicator : (2a) by a coherent sampling design with independent and permanent routes, (2b) on a coherent area without limiting to habitats with high visibility (e.g. agriculture meadows only), (2c) by ensuring a sufficient number of repetitions and (2d) by correctly interpreting the results (e.g. use the mean value of the indicator and not the maximum).
In 2012 the Belgian area covered by spotlight counts was 428,456 ha for 266 sectors. Coherent sampling routes were not yet defined for 31 % of them. The number of repetitions greater than or equal to 3 was 62 % (vs 20 % in 2010).
To improve the standardisation of the spotlight counts and to convince the managers (hunters and foresters) to properly use it as an indicator, different means were used :
- scientific monitoring of populations on a sample of representative experimental territories (with intensive long-term spotlight counts on radio-collared individuals) where other indicators are implemented (e.g. herbivore habitat impact indicator),
- proposal of alternative methods for computing culling plans based on indicators and adaptive management,
- communication on these local results and methodologies through conferences, workshops and papers.

Despite the apparent simplicity of an indicator of ecological change, important communication efforts are required to assume their correct implementation and interpretation, a fortiori at the scale of a region.

O.TL.38

Monitoring under uncertainty for informed management decisions about poaching in the Serengeti

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KEYWORDS : bushmeat hunting ; virtual ecologist

Monitoring is an essential tool in conservation often used to trigger management interventions, inform management decisions, measure success against stated objectives, and learn about the system. In order to be useful, monitoring must be effective (i.e. able to detect true trends over time) and, under great time, budget and observational constraints, managers may be better off allocating resources to other interventions instead of monitoring. Monitoring effectiveness and efficiency are thus key considerations when planning and implementing conservation interventions.
The importance of detecting changes at appropriate scales and with adequate confidence levels has often been emphasized but a number of factors may affect monitoring effectiveness, ultimately affecting management decisions and their robustness to uncertainty. For example, the defined time frame may not be adequate for the management requirements, monitoring effort may not be enough or appropriately targeted to detect trends or the selected method for analysis may not be appropriate. The degree of environmental and demographic stochasticity and observation error also affect the quality of the monitoring data and its reliability. Moreover, identifying appropriate monitoring targets is essential for efficient conservation and the choice of survey method is crucial for obtaining robust and reliable trends, particularly when monitoring the abundance and use of natural resources.
Using selected ungulates and poaching in the Serengeti ecosystem as a case-study, we used simulation modelling to investigate monitoring effectiveness and efficiency under uncertainty. Specifically, we investigated under which budget, observational and ecological conditions are managers able to detect true trends from monitoring data, and explored trade-offs between monitoring decisions and types (ecological or social), with a focus on the occurrence of type I and II errors in function of time. This enables us to provide insights into the likely effect of different types of uncertainty on management decision-making and more generally to present a framework for evaluating monitoring programmes and management in a virtual environment under uncertain levels of poaching.

O.TL.39

How to measure and predict the management impact on red fox population dynamics?

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KEYWORDS : compensatory mortality ; density-dependence ; life table ; matrix population models

Population managers of species considered as 'pest' aim to optimize intensity and quality of harvest in order to reduce local densities while preserving viable animal populations. To answer this issue, matrix population models are known to enable the measure of management impact on population dynamics and the prediction of population demography under different pressures. The red fox (*Vulpes vulpes*) is controlled due to its predation on farming and game species, or diseases it can spread. Despite 70 years of studies, the real impact of red fox management on the species demography remains poorly understood. Moreover, vital rate estimations are scarce for this common species although information on survival, reproduction and growth rate is necessary to build population models.

Here, we present a red fox population model based on 6 years surveys realized by the French Wildlife and Hunting Agency (ONCFS) on 5 populations, two of which under Before-After Control Impact (BACI) design. Population densities were annually estimated with Distance Sampling. Age-specific fecundities were assessed using placental scars count from uterus analysis. Time series of age-specific survival rates were estimated from age-at-harvest data. Finally, annual harvest rates were derived from harvest data relative to estimated population sizes.

First, we demonstrate that harvest effort has a significant impact on red fox populations. But, the reduction of population densities requires an intensive effort that remains sometimes incompatible with practical management. This ability of red fox populations to support harvest could be explained by a negative density-dependence growth that might counterbalance density reduction. Then, we build matrix population models using estimated demographic rates. Prospective perturbation analyses are performed to identify the most important rates in the red fox demography in light of the slow-fast continuum of life-history strategies. We also realize Retrospective Life Table Response Experiments based on the two BACI populations to identify the relative contribution of parameters on growth rate reduction. Finally, all these analyses suggest that compensatory processes might occur in our populations, involving density-dependence and/or immigration. This compensation could complicate the relationships between harvest and survival rates.

Thanks to an important dataset, our study significantly increases our knowledge of the red fox demographic response to harvesting. However, a precise understanding of the compensatory mechanisms will be necessary to improve guidelines accuracy towards explicit indications on harvest rates. The central issue will be to disentangle the relative effects of intraspecific competition and immigration thanks to Integrated Population Models or additional surveys with recovery of marked animals.

Abstracts
Oral presentations

Impacts Wildlife > Humans

O.WH.01

Demographic structure and body condition of hunted and by-caught Baltic grey seals

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KEYWORDS : age ; blubber thickness ; Halichoerus grypus ; sex

In order to find solutions to the seal-fishery-conflict in the Baltic Sea it is important to know which part of the seal population causes most frequently problems to fishermen. We collected samples of hunted and by-caught Baltic grey seals (*Halichoerus grypus*) from hunters and fishermen from Finland in 2005-2012. We studied the demographic structure and body condition (sternum blubber thickness) to see whether the by-caught seals and those shot near the coastal fishing gear (mainly traps) consist of similar individuals as seals hunted from the outer archipelago. Most by-caught seals were pups, more often males than females. About 10% of by-caught seals were sub-adults (1-4 years old), and all of them were males. Also the adult by-caught seals were males, except one 40-year old female. Most seals shot near fishing gear were adult males. Nineteen percent of the hunting bag consisted of pups and 32% were sub-adults, and there were more males than females among them. Sex ratio (males/females) of the total catch was 1.25. However, sex ratio of the population, estimated on the basis of life tables, was lower (0.87). The preliminary results thus suggest that pups are overrepresented and sub-adults underrepresented among by-caught seals, and males are overrepresented among all 'problem seals' (as well as in the hunting bag). Problem seals had a thinner blubber layer than hunted seals, and blubber layer of all groups was thinner in spring than in autumn, but the age and sex of the seal did not affect the blubber layer.

O.WH.02

Using drones to count the elephants

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KEYWORDS : survey ; UAS ; UAV ; wildlife

The use of UASs (Unmanned Aerial Systems) in wildlife survey is still recent but the fast development of this technology shows great possibilities and it could soon become an inevitable tool in wildlife management.

The purpose of this study was to test the feasibility of inventories by UAS to survey large mammals in the Nazinga Game Ranch in the south of Burkina Faso. The Gatewing X100TM equipped with a Ricoh GR III camera was used to test the animal reaction as it passed, and their visibility on the images. A set of more than 7000 images was collected and observations revealed that only elephants (*Loxodonta africana*) were easily visible while medium and small sized mammals were not. At a height of 100 m the easy observation of elephant allows experts to enumerate them on images and no reaction was recorded as the UAS passed. We therefore implemented an aerial strip sample count along transects used for the annual wildlife foot count. A total of 34 elephants has been recorded on 4 transects, each overflown twice. The elephant density was estimated at 2.47 elephants/km^2 with a coefficient of variation (CV%) of 36.10 %.

UAS inventory of elephants is promising but improvements need to be done. The main drawback of our UAS was its autonomy. If we wish to replace manned aircraft survey of large areas (about 1000 km of transect per day vs 40 km for our UAS), increased endurance of small UAS is a requirement and the monitoring strategy should be adapted according to the sampling plan. Also, the UAS is as expensive as a second-hand light aircraft. However the logistic and flight implementation are easier, the running costs are lower and its use is safer. With technological evolution making civil UASs more efficient, they will be able to compete with light aircrafts for aerial wildlife surveys.

O.WH.03

Do we have a wild boar problem ? A cost-benefit analysis

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KEYWORDS : benefits ; damages ; hunting ; wild boar

The assessment of an overabundance and the need for regulating wild boar populations is widely accepted. Usually the following damage categories caused by wild boar are of major concern :

1. Damages to agricultural land
2. Spread of diseases like Classical Swine Fever
3. Damage to gardens or other green urban areas
4. Damages caused by vehicle collision

But the increase in wild boar presence also generates an increase in wild boar related benefits mostly linked with wild boar hunting. A cost-benefit analysis should be focused on hunters and landowners because these stakeholders are in charge of wild boar management in most European countries.

The cost-analysis presented here is simply based on representative records of compensations paid by hunters to landowners for damages (mostly to crops or grassland) caused by wild boar per hectare and year. Some European countries like Luxemburg or Switzerland maintain representative statistics on wild boar damages. The analysis of benefits is based on representative records of the income landowners receive from renting their hunting rights to hunters. In many countries the rent level is freely negotiable and official statistics are sometimes accessible like in Germany.

By comparing these different sources of information I found that in agricultural areas compensations paid to cover damage by wild boar usually average between 2 - 5 Euro per year and hectare. But on the other hand, expenditures paid by hunters per year and hectare to rent hunting rights from landowners were on average two to ten times higher.

This clear result indicates that even today overabundant wild boar could be regarded rather from a more beneficial than from a harmful perspective. Consequently, the European wide failure of management plans aiming to regulate wild boar might be more the results of those human dimension factors than any other.

O.WH.04

Habitat use of wild boar (Sus scrofa) in an agricultural area - a problem ?

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KEYWORDS : agriculture dominated area ; crop damage ; Lower Saxony ; spatial behaviour

All over Europe wild boar (Sus scrofa) population densities are increasing and spreading into agricultural and cultivated regions. As a result economic problems, like field damages and thread of diseases outbreak rise. So far most studies were conducted in forests, were recently the wild boar mainly occurred. We started a research project in an agricultural dominated region in Lower Saxony, Germany concerning seasonal home ranges and habitat preferences of wild boar.
Wild boar were captured in box traps, marked with serially numbered ear tags and fitted with VHF radio transmitter. Thereafter daily resting places of the marked wild boars were taken and tracked during two nights per week, to gain new information about activity range in a landscape dominated by agriculture. Within two years 23 boars were captured, marked and there from 19 fitted with transmitters. The habitat was mapped in May and June 2011 as well as in the following years 2012 and 2013. Also during 2012 damages of wild boar in grassland were mapped. Habitat use as well is often analysed in regions with a high percentage of forest. The study area in Lower Saxony is clearly dominated by agriculture with only small proportions of bush land and forest. Use-availability was analysed with Chi-square tests, Bailey-intervals (Cherry 1996) and Jacobs´ index (Jacobs 1974).
Mean summer home ranges (May until August) were about 900 ha and were hence higher compared to previous studies in areas with higher proportions of forest. Outstanding were the complete shifts of the daily resting sites in June and July from forest into fields by all observed wild boar. Other studies showed that during summer to a certain percentage of wild boars remained in forest.
In Summer the spatial and habitat use showed a clear preference of corn. Although after use availability analyses grassland in sum was avoided, it has been used gladly as food source within a distance of maximum 50 m to structures as forest or hedge rows. Damages in crop fields by wild boars were marginal.
The changes in agriculture, accretive monocropping and cultivation of energy crops promote good coverage and nutrient rich food in an otherwise exposed landscape. New habitats for wild boars are created and enable them to become for a season ‘field sows’. Most damages were caused in grassland, which still made a high part of the agriculture in the region.

O.WH.05

How to live with foxes in an highly urbanized region

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KEYWORDS : Brussels Capital Region ; communication ; species management

Since the reappearance of foxes (*Vulpes vulpes*) in the Brussels Capital Region (Belgium) in the early seventies of the twentieth century, a lot has been said and written about this mysterious animal both by supporters and opponents. Brussels Environment, the administration responsible for environment and energy policy in the Brussels Capital Region is responsible since its foundation in 1989 for the monitoring and the management of this species. Its key role is to raise awareness among the one million inhabitants about the presence and the ecology of this remarkable resident.
Foxes are strictly protected in the Brussels Capital Region where hunting is forbidden since 1991. A milestone in research of the Brussels population is a study executed by the Belgian Scientific Institute for Public Health (WIV-ISP) on demand of Brussels Environment (De Blander *et al.* 2004). It turned out that the population is in good health and no cases of any aggressiveness have been recorded. Furthermore a detailed distribution map was made up, which showed the highest densities of foxes in the residential areas and not in city parks or other large green areas such as the Sonian Forest. Since that time, the population of foxes is denominated as 'urban fox', in contrast with the much more shy fox population which occurs in the surrounding Flemish Region.
Since 2003 Brussels Environment disposes of a database that centralizes all the external calls (questions and complaints) about foxes and enables to identify which problems do occur and where. Furthermore distribution data have been completed during the recent years with data coming from volunteers. Thanks to this information it is known that the Brussels Capital Region is full of foxes since more than ten years, that is to say that territories are covering the whole region without any gaps. The highest densities occur in the southeastern part where foxes can find sufficient food and places to rest (waste land, private gardens and city parks). Brussels Environments communication key message is not to feed these animals and to try to minimize the offer of food (fruiting trees, garbage collection, household refuse, food for pets,…).
Field interventions for weakened animals (injured, ill, exhausted or lost/blocked) are carried out by the Brussels Bird Protection team (co-financed by Brussels Environment). Procedures were also set in for the collection of dead foxes. To answer other questions (e.g. robbing of poultry) a whole range of communication tools are being developed such as a website, a brochure, a book, a pdf-file, even a participation in a television documentary about Belgian biodiversity. But most important is the personal contact with people who are confronted with foxes.

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Abstracts
Oral presentations

Interactions Wildlife-Wildlife

O.WW.01

Breeding sites and migration routes of woodpigeons Columba palumbus wintering in south-west Europe

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KEYWORDS : origins ; satellite tracking ; stopover

Establishing patterns of movement of migratory birds is essential for our understanding of their ecology, life history and behaviour. However, the detailed movements of many birds are virtually unknown, in spite of the importance of this information for their effective conservation. The woodpigeon *Columba palumbus* is one of the most widely distributed and abundant birds in the western Palearctic. The woodpigeon is primarily migratory and can fly up to 3,500 kilometers during its annual seasonal migration. To date, knowledge on the migration and wintering behaviour of the woodpigeon is based on visual observation of migrating and wintering birds and the evaluation of ring recoveries. More detailed information for individuals could however not be obtained using these methods. In France and Iberia, although some native woodpigeons are short-migrants or nomadic, most are sedentary. During fall and winter, these countries contain millions of birds of different origins, i.e. residents, migrants, and winterings. We identified migratory movements and breeding areas of wintering populations, using wild individuals fitted with satellite transmitters. From 2003 to 2012, in south-western France and Portugal, thirty-six woodpigeons were captured in February and were tracked during several months. Following capture, birds spent from 3 to 4 weeks near the site of capture. All left their wintering grounds in early March and migrated generally north or north-west. Most birds arrived at breeding areas between mid-April and mid-May. In general, fall migration began in the first half of October. The routes traveled by woodpigeons during spring and autumn migration were quite similar. Autumn migration, taking between 2 to 4 weeks, was somewhat quicker than spring migration. Stopover duration varied greatly, between one day and three weeks. A bird, equipped in Portugal in February 2009, spent more than one year (05/14/2009 to 10/03/2010) in the same area in Switzerland and only flew as far as southern France in October 2010 where it spent the winter. In the following year (2011) the bird completed their migration journey over a short time period (7 days), without prolonged stopovers (> 1 day). It migrated again to northern Switzerland, where it spent all the breeding season (03/26/2011 to 10/11/2012). An other bird, which was equipped in Portugal (February 2009) and tracked over three migration periods, spent the two following winters in south-west France. This bird breeded first in Kozy, Poland, and spent the two successive breeding periods, in Orlowiec, Poland, some 150 km to the north-west. A third bird, equipped in south-western France (February 2011), accomplished its first journey in three weeks, with a stopover of seven days. It reached its breeding locality at Raon-l'Etape, eastern France, on March 23. It spent the following winter (10/25/2012 to 03/05/2013) in Chaume-et-Courchamp, some 120 km to the south-east. In summary, tracking by satellite have provided detailed information about the exact timing of migration, migration speed, migration directions, and stopover sites used by woodpigeons wintering in south-western France and Iberia. The implications of our findings are discussed.

O.WW.02

Population dynamics of the European hare (Lepus europaeus) in two contrasting regions in Flanders

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KEYWORDS : hunting bags ; juvenile to adult female survival ; percentage juveniles ; reproduction

European hare (*Lepus europaeus*) populations show a decline all over Europe (Mitchell-Jones et al., 1999; Smith et al., 2005). Different authors have determined factors underlying the population decline as being principally agricultural intensification (Tapper & Barnes, 1986; Smith et al., 2005), predation (Tapper & Barnes, 1986; Panek & Bresioski, 2002), diseases (Wibbelt & Frölich, 2005) and overshooting (Marboutin et al., 2003). On the local scale, these (interacting) factors influence the local population trends by influencing key population characteristics like reproduction (Marboutin et al., 1995), survival (Pielowski & Raczynski, 1976; Keith, 1981) and the percentage of juveniles in the population (Slamecka et al., 1997).
The present research compares hare population characteristics in two regions in Flanders : the Wildlife Management Unit (WMU) Westhoek area and the WMU Ieperlee area. Both regions are agricultural lowland areas, however in the WMU Ieperlee area woodland patches are more abundant and the mean area of separate parcels is smaller than in WMU Westhoek. Since 2010 (WMU Westhoek area) or 2011 (WMU Ieperlee area) the hare population dynamics are investigated by sampling of the hunting bag. Yearly between 31 and 55 hares were sampled for each of both areas. Each hare was measured and weighed. Eye-lenses and uteri were collected. Age (juveniles versus adults) was determined through the weighing of the eye-lens (Suchentrunk et al., 1991). Counting of uterus scars (Bray et al., 2003; Hackländer et al., 2001) was used to measure the reproduction of each female hare. Additionally land use data and weather information were collected.
The project is still in progress, yet first results are already available. These results indicate that reproduction characteristics and the ratio of juvenile to adult female survival not only show strong differences between both regions, but also between years in one region. These differences might originate from a quick population response of the European hare to the interaction of factors as weather, land use and predation on the local scale.
Remarkably the percentage of juvenile hares in the declining hunting bag (period 2001-2011) was almost constant at 35 % in the WMU Westhoek area during the sample period. This is a low percentage compared to literature (eg. Marboutin et al., 1995 (48-69 %); Pintur et al., 2006 (50.4 %)). The population dynamics underlying this low percentage of juveniles however showed year-to-year variations, the ratio of juvenile to adult survival being less than reported in literature (eg. Zörner, 1978; Marboutin et al., 2003) in 2010 and 2012 and the reproduction being less than normal in 2011 (eg. Frylestam, 1980). In the WMU Ieperlee area in contrast, the percentage juveniles in the hunting bag differed strongly between the two sample years (58 % and 40 % respectively). The lower share of juveniles in the hunting bag in 2012 was mainly explained by a simultaneous decrease in juvenile to adult female survival and in juvenile reproduction. It will be investigated if the collected environmental factors can partially explain differences in population characteristics between years and between regions.

O.WW.03

Does predation occur on grey partridges with pathological process ?

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KEYWORDS : disease ; Perdix perdix ; predation ; toxicology

Whether predation occurs on low quality or healthy prey individuals is often debated and is an important point in conflicts between conservationist and hunter stakeholders. We investigated this topic by performing necropsies and residue analyses on carcasses of radio-tagged dead grey partridges.
We conducted a large radiotracking study on 12 sites (ca.14500 ha) in intensive cereal farming landscapes of North-Central France in 2010-2011. We tagged 529 wild grey partridges. The location of each bird was reported twice a day from early March to late August on a GIS. When a bird was determined as dead, its carcass was retrieved within few hours after death in order to limit scavenging. The area surrounding the body was inspected to find clues explaining death (predation, collision, disease, intoxication or other causes). Whenever possible, gross pathologic examination was performed by veterinarians. The aim was both to verify field hypothesis and to identify whether 'hidden' causes could have increase partridge vulnerability to predation. For this purpose fat condition have been scored, and parasitological and bacteriological examinations have been performed. Signs differentiating scavenging from predation received special attention, and the diagnosis degree of certitude was scored regarding predation. The occurrence of a pathological process was based on pathological picture or the presence of a pathogen. In addition, internal organs were sent to a laboratory for residue analyses to investigate potential acute poisoning by chemicals to which birds had been potentially exposed.
Of the 529 radio-tagged partridges, we recorded 261 casualties. The mean mortality rate through the spring and summer was 0.5. The main proximate cause of mortality determined through field signs (hereafter MFS) was predation (79%).
44% of the 261 dead birds were sent to a laboratory, but 25% of them did not allow the realization of a suitable gross pathological examination (putrefied carcasses, too many organs missing).
Damages identified during necropsies (N=85) were compatible with MFS in 81% of cases.
However the rate of MFS for which necropsy was performed varied according to the cause of death. For example, a necropsy was performed for 100% (13) of carcasses when a disease was suspected on the field, against 22% (45) for predation.
Necropsies concluded to predation as the cause of death with a 'high degree of certitude' in 66.7% of cases (30). No pathological picture was associated with predation in 78% (36) of cases.
Residue analyses were realized on 94 dead birds. At least one chemical was detected in 22 of 57 carcasses of partridges dead from predation according to field signs. In only one instance we could conclude that poisoning (by carbofuran) could have favoured predation.
Our results are not conclusive but show how it is difficult to investigate this topic. Indeed, despite of intensive tracking, a necropsy could be performed for 1/3 of mortality. Moreover determining of pathological process and its effect on a bird are often difficult.

O.WW.04

An investigation of association and fusion-fission patterns in African buffalo based on GPS telemetry

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KEYWORDS : African ungulate ; contact patterns ; herding behaviour ; social interactions

The African buffalo (Syncerus caffer) is a gregarious species living in socially structured populations. The most stable social unit, the breeding herd, consists of a set of individuals (adult females, sub-adults and youngs) using a same home range (HR). Breeding herds are subject to interactions and fusion-fission events, according to dynamics and mechanisms still poorly understood. African buffalo host a large array of pathogens, whose transmission is conditioned social interactions. In this study, we investigated the patterns of interaction of buffalo in Gonarhezou National Park, Zimbabwe. For this purpose, 12 adult females were GPS-tracked during one year. Spatial analyses showed that the tracked individuals were organised in two adjacent herds. HR overlaps between herds were small (3 to 8%), contrasting with strong overlaps within herds (60 to 80%). Interestingly, the association ratios between individuals (based on the time individuals spent together) were much smaller, both at intra-herd (20 to 40%) and inter-herd levels (0 to 0.1%). At inter-herd level, most contacts (75%) lasted less than one hour and the maximum duration for one contact was 14 hours. During the dry season, 80% of the inter-herd contacts occurred within 400 m of water points. At intra-herd level, fusion events also were strongly related to surface water distribution (half of them occurring within 200m). Results emphasize a strong behavioural avoidance between herds, and a high degree of spatial organisation within herds, despite a low degree of temporal association between individuals. Water points appear to play a key-role on social (and thus epidemiological) interactions.

O.WW.05

Linking animal movement and reproduction through tracking data

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KEYWORDS : migration ; movement ecology ; reproductive -status ; reproductive cost of movement

A persistent challenge in animal ecology is to link animal movement to demography. Such studies require monitoring of life history events and changes in survival and reproduction of individuals and their offspring corresponding to their movement patterns. Reproduction entails costs and these costs when added to the movement costs will affect the movement of an individual, especially in large mammals. If we look at step-lengths, then the effects of increased costs on the movement through reproduction should be visible in the patterns of speed and turning angles, as bearing a young which initially moves slow, and ensuring its survival will affect movement of a mother, by slowing it down.
Using movement data from 110 GPS collared female migratory moose (Alces alces) and field observations of their calf survival; we link movement to reproductive status. We use Net Squared Displacement approach to estimate migration parameters and compare persistence velocities and turning velocities during travel (spring and autumn) and foraging phases (summer and winter) of three classes of females- females who did not reproduce, those that reproduced, and lost their calf/calves during summer and those whose calf/calves survived during the summer. Logistic regression models were used to compare the three classes of females in relation to their seasonal velocities and turning angles.
Spring and autumn velocities for individuals were on an average 6-8 times higher than summer and winter velocities. There were no differences in the average migratory distance of the three classes of females. Age had a significant effect on reproductive status. Females who lost a calf during summer travelled faster and turned less in autumn compared to those, whose calf survived, demonstrating the cost of having a calf. In addition, females that had a calf at heel had generally lower speeds during summer. Females that did not reproduce had the longest duration of migration among the three classes of females.
We show that with sole use of movement data, reproductive status can be linked to movement and the loss of offspring can trigger changes in movement patterns of females, which can be observed in their speed and turnings. This is a clear case of movement costs of reproduction, as females that were not constrained by reproduction, did not demonstrate significant changes in speed and turnings and those that reproduced had to ensure their offspring survival by moving slower than other females.

O.WW.06

Eurasian lynx hunting red deer : is there an influence of winter enclosure system ?

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KEYWORDS : Cervus elaphus ; Lynx lynx ; prey density ; supplementary feeding

According to the theory of optimal foraging, carnivores should take advantage of exploiting the most abundant and accessible prey sources. Making the best feeding choices may become fundamental in winter, when energetic demands increase owing to hard climatic conditions. In Central Europe, the Eurasian lynx (*Lynx lynx*) mainly prey on roe deer (*Capreolus capreolus*), but also red deer (*Cervus elaphus*) is an important component of lynx winter diet. As in several Central European countries, in the Bavarian Forest and Šumava National Parks (Germany and Czech Republic, respectively) a system of winter enclosures is used to reduce damage to vegetation by red deer. Deer enter the enclosures attracted by food in November-December and are kept there until April. Thus, as such fenced forest patches represent predictable and abundant prey sources throughout the whole winter, we hypothesized that lynx should be attracted by the enclosures and kill red deer more often inside or near them than far from them. To test this hypothesis, we used data collected inside the National Parks during a GPS-telemetry study on 8 lynx (from 2005 to 2012 discontinuously, n=37 confirmed red deer kills). First, we divided the area into a 200x200m grid and analyzed if the patterns of lynx presence, independently of hunting activity, were influenced by the distance to the nearest enclosure, the relative densities of red deer and roe deer, the mean altitude and habitat structure. Then, we registered the presence/absence of a red deer killed by lynx inside each cell, we tested if the probability of predation was correlated to the same factors mentioned above and if this probability differed inside and outside the enclosures. Lynx presence positively correlated with habitat heterogeneity, terrain ruggedness and relative densities of both deer species (despite a significant negative correlation between these densities). A significant but slight negative correlation was found between lynx presence and the distance to winter enclosures, although the percentage of 200x200m cells that were visited by lynx tended to be higher outside the enclosures than inside. The probability to find a red deer killed by lynx correlated positively with habitat heterogeneity and negatively with elevation and terrain ruggedness. Interestingly, no correlation was found with the distance to winter enclosures, but the probability of predation tended to be higher inside the enclosures than outside. Therefore, contrary to our expectations, the presence of winter enclosures did not have any clear effect on the spatial distribution of red deer killed by lynx, although lynx actually hunted inside these structures. In the Bohemian-Bavarian Forest, red deer estimated numbers are quite high and lynx is the only carnivore which is able to kill this large ungulate species. Natural regulation by predators is considered insufficient in the area, which leads to red deer population being partially regulated by human hunting also inside the two National Parks. Thus, in order to improve the red deer management system inside both Parks, it is fundamental to investigate if and under which conditions lynx predation can assume a more important regulating role.

O.WW.07

Top predators, mesopredators and their prey : the importance of ecosystem context in species interactions

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KEYWORDS : Eurasian lynx ; mesopredator release ; red fox ; trophic cascades

Top predators such as large carnivores have several potential impacts on the structure and function of ecosystems. Through different forms of species interactions, they can suppress the density of large herbivore prey as well as medium-sized predators (mesopredators). This can in turn have indirect cascading effects on other species. However, our ability to predict the specific effects of top predator decline, extinction or recolonisation remains limited. This is because the impact of top predators on ecosystems is context dependent, i.e. conditioned by several factors such as ecosystem productivity, species composition and diversity, as well as human interference. The context dependence of top-down effects is demonstrated using the example of Eurasian lynx (Lynx lynx) in Fennoscandia, and its interactions with an abundant mesopredator, the red fox (Vulpes vulpes) along bioclimatic productivity gradients. According to the mesopredator release hypothesis, large carnivore suppression of mesopredators is a key ecosystem function which can have cascading effects on small herbivore prey. Lynx kill red foxes, to decrease interspecific competition and/or for consumption, and it can therefore be predicted that lynx should suppress red foxes. This prediction was supported by large-scale analyses of lynx and red fox data during lynx decline due to persecution in 19th century Sweden, and during lynx recovery in Finland over recent decades. However, both studies showed that that the top-down impact of lynx depended on ecosystem productivity. Furthermore, the Finnish study, which used data from the Finnish Wildlife Triangle Scheme and covered a 200 000 km^2 study area over 17 years, also showed cascading effects on herbivore prey, the mountain hare (*Lepus timidus*). Where lynx abundance was high and increased with productivity, fox abundance was limited below the level expected from productivity, whilst hare abundance was determined bottom-up by productivity rather than top-down by predation. This suggests that lynx had an indirect positive effect on shared herbivore prey such as mountain hare. In contrast, where fox abundance was high and increased with productivity, hare abundance was limited below the level expected from productivity. Thus, the cascade involving lynx, red foxes and mountain hare affected the large-scale community structure, but only in some contexts. The impact of increased productivity could either increase or dampen the effect of this large carnivore, depending on the specific characteristics of the ecosystem, including species composition and community complexity, which can change along natural bioclimatic gradients or due to human interference. When projecting effects of changes in top predator status, one must therefore take into account the specifics of a particular ecosystem, and it may not be justifiable to extrapolate effects between regions or across time periods.

O.WW.08

Mesopredator abundance in presence and absence of large predators - a continental approach

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KEYWORDS : apex predators ; bottom-up ; top-down

Large consumers have been eradicated from many ecosystems - a trophic downgrading where top-down control are lost or shifted to another trophic level, resulting in an alternative ecosystem state. Such trophic processes often occur on large scales and interact with anthropogenic processes (Estes, J. A. et al. 2011). Large-scale structures of ecosystems are predicted to be determined by a combination of top-down and-bottom up processes, alternately limiting species at different trophic levels. The top-trophic level is limited bottom-up, while the next trophic level is limited top-down. However, a loss of the highest trophic level implies a shift in limiting direction of all trophic levels (Oksanen, L. et al. 1981). Loss of large predators does not only affect large herbivores, but can also cause a mesopredator release where midsized predators can increase in abundance when they are released from intraguild killing (Elmhagen, B. et al. 2010, Soulé, M. E. et al. 1988). Based on this, midsized predators are predicted to be limited top-down in presence of large predators, not responding to bottom-up factors; in absence of large predators midsized predators should take the position of apex predators in the ecosystem, and be limited bottom-up or socially regulated. An alternative ecosystem state can thus be expected where large predators have been eradicated.
We investigated top-down (large predators) and bottom-up (winter severity, productivity, tree cover and human density) effects on a common midsized predator, the red fox (Vulpes vulpes) in Europe and northern Eurasia, thereby modeling ecosystem processes on a continental scale. We used structural equation modeling (SEM) to test direct and indirect effects of the variables. The Eurasian lynx (*Lynx lynx*) was found to be an important predictor of red fox abundance, not only directly but also by partially mediating a negative effect of winter severity. We therefore used lynx for following analyses of bottom-up effects on red fox in presence or absence of top-down limitation. Bottom-up effects within and outside the distribution range of lynx was compared using SEM. Further, we analyzed landscape effects (anthropogenic, semi-natural and natural openness) in presence and absence of top-down limitation using generalized additive models.
Although bottom-up factors affected red fox abundance both in presence and absence of lynx, an inhibiting effect was important in presence of lynx while subsidizing effects was important in absence of lynx. Analyses of openness reveled that crop fields had a significant impact on red fox, and this effect was only detected in absence of top-down limitation. This indicates that anthropogenic openness has a positive effect on red fox abundance in absence of top-down limitation. The highest red fox abundances were reached outside the distribution range of lynx when crop fields constituted about 35% of the landscape. Red fox abundance did not continue to increase after this threshold, suggesting social regulation in absence of top-down limitation. In presence of lynx, red fox was not associated with openness and never reached densities high enough to become socially regulated. We suggest that two alternative ecosystem states exist in south-western Eurasia.

THEMATIC SESSION

Large Carnivores

There is no doubt that large carnivores are a very special species group. The problem is that they are special in very many different ways. From an ecological point of view they exert very strong impacts on the ecosystems which they inhabit, and may in some cases act as true keystone species. From an aesthetic point of view they represent species of great beauty with an ability to inspire a sense of wonder. From a livestock or reindeer herder's point of view they can represent a source of economic loss and the cause of much extra work. Hunters may view them as a valued game species, or a competitor for shared prey, or both! From a social point of view they can be associated with a diversity of conflicts between various stakeholders who hold diverging views about them. They represent a great challenge for wildlife managers who need to balance all these points of view. And finally for scientists they represent fascinating species to study, both for their own sake and because of the way humans interact with them. There is probably no greater test of humanity's stated desire to conserve biodiversity.

This special session on large carnivores contains a diversity of talks that cover the full geographic and disciplinary diversity associated with large carnivore management. Most speakers come from Europe, which represents one of the most fascinating arenas for large carnivore conservation, although we are lucky to have a speaker who will provide a contrast by talking about the North American situation. The geographic spread in Europe ranges from Italy to Norway, and Belgium to Russia. Ecological topics covered range from predator prey studies, to habitat modelling and anti-predator behaviour. Many presentations deal with practical management issues such as census, communication and damage prevention, as well as a focus on European level policy. Finally, several presentations will touch on issues related to public acceptance which is really the bottom line in many conservation initiatives. The collection of talks and posters in this session provide a good overview of the diversity of management issues and research approaches that are necessary to begin to understand the complexity of large carnivore conservation.

John Linnell,
Norwegian Institute for Nature Research, Trondheim, Norway.

INTRODUCTORY PRESENTATION

Hunter vs predator : exploring the complex relationships between hunters and large carnivores

John Linnell
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The relationship between human hunters and wildlife conservation is complex and controversial. In many areas of the world, and in many parts of our history, unregulated hunting has led to declines in many wildlife species. However, there are many other areas where hunters have been instrumental in restoring wildlife populations, and where hunting management has provided good models for sustainable use of natural resources. Furthermore, recent social science research has revealed a great deal of common ground between hunters and environmentalists concerning their underlying values, and their shared concern for wildlife and wild places. This common ground represents a large, but underexploited, potential for cooperation. However, there are a number of areas that represent great challenges for this potential hunter-environmentalist alliance, and one of the most difficult concerns large carnivores.

Large carnivore populations are generally recovering in many parts of Europe, and in some areas are associated with significant conflicts. The most widespread conflict, depredation on livestock, is widely studied and recognised. However, in recent years it has become apparent that conflicts with hunters represent a crucial, less well understood, and not widely recognised, issue. The relationship between large carnivores and hunters is highly complex. On one hand, hunters can value large carnivores as an attractive quarry. This concerns both the challenge and excitement of taking part in the hunt, and the possibility to use proceeds from the sale of licenses to fund their other wildlife management activities. On the other hand, hunters can perceive large carnivores as competitors for shared quarry, as factors that interfere with their hunting of other species (e.g. if wolves kill hunting dogs), or as symbols of external interference in rural affairs.

This presentation will summarise the results of recent research to explore the nature of the relationship between modern day European hunters and large carnivores, with a view to identifying potential conflicts and solutions.

O.LC.01

Actions on large carnivores at the level of the European Union

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KEYWORDS : conflict-resolution ; population approach ; social carrying capacity ; stakeholder dialogue

The Habitats Directive of the European Union provides the legal framework for the protection and sustainable management of large carnivore species (the brown bear, the wolf, the Iberian and the Eurasian lynxes and the wolverine) in EU. The 2008 guidance document from the European Commission promotes population-level approaches to the management of large carnivore populations.
A recent update on the statuses of large carnivore populations in the EU shows that most populations are stable or increasing. There are a few declining populations, in contrast to which large carnivores species are returning to some areas where they became extinct a long time ago. The potential conflicts of damage to property (especially livestock) and human safety considerations in these areas now affect rural people who have not shared their living space with large carnivores for several generations. On the other hand, there are rural communities in areas where substantial large carnivore populations have survived who have maintained practices and knowledge to co-exist with these predators.
The presentation will describe the process that DG Environment of the European Commission initiated in 2012 to faciliate a structured dialogue with, and among the different stakeholder groups, to find solutions to human-large carnivore conflicts, and to help to exchange good practices of successful co-existence with these predators. The focus of this initiative is on the social rather than the ecological carrying capacity, which will necessitate new approaches and new disciplines of scientific support. The long-term objective of this process is to set up an EU Large Carnivore Initative, under the umbrella of which the different stakeholders would hopefully find it in their vested interest to commit themselves to be part of this constructive dialogue. The Iberian lynx, a highly endangered species with a limited distribution, is not part of this exercise because of its special situation.
A stakeholder workshop in January 2013 was a first step to assemble representatives of as many stakeholder groups as possible from different Member States of the EU where large carnivore occur, or where they are expected to return to. The results of the workshop show that it is possible to formulate the desires of the different stakeholders either in favour of or opposed to large carnivores in such a way that a constructive dialogue can follow with a view to finding conflict-minimizing solutions. The diversity of large carnivore species and their conservation statuses, and the diversity of stakeholders and how they see large carnivores result in a very complex picture human-large carnivore relations across the EU, therefore the next step of the process will be to initiate some pilot dialogues at the regional level.
Although the current activities will be supported by techniques originating from the social sciences, wildlife biologists will continue to play a crucial role, e.g. in providing reliable population data from monitoring programmes using state-of-the-art techniques.

O.LC.02

Challenges to predicting ungulate population dynamics in three wolf-ungulate systems

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KEYWORDS : carnivore recovery ; large carnivore ; predation ; predator-prey

With the recovery of large carnivores such as wolves, bears and felids throughout the Northern temperate zone, ungulate managers face new challenges in predicting ungulate population dynamics. While ecological theory suggests large carnivores may often reduce ungulate densities, in practice, it is becoming increasingly evident that the additional complexity of carnivore-ungulate dynamics challenges our ability to predict ungulate population dynamics with large carnivores. Predation rate (PR), kill rate and predator-prey ratio's are all thought to be fundamental parameters in models of predator-prey dynamics for understanding and predicting predation. However, relatively little is known about how these statistics explain prey population dynamics. We assess these relationships across three systems in North America where wolf-ungulate dynamics have been observed for 41 years (Isle Royale), 19 years (Banff) and 12 years (Yellowstone). Theoretical simulations indicate that kill rate can be related to predation rate in a variety of diverse ways that depend on the nature of predator-prey dynamics. These simulations also suggested that the ratio of predator to-prey is a good predictor of prey growth rate. The empirical relationships indicate that predation rate is not well predicted by kill rate, but is better predicted by the ratio of predator-to-prey. Kill rate is also a poor predictor of prey growth rate. However, predation rate and predator-prey ratio's each explained significant portions of variation in prey growth rate for two of the three study sites. Our analyses offer two general insights. First, it remains difficult to judge whether to be more impressed by the similarities or differences between these 3 study areas. Second, our work suggests that kill rate and predation rate are similarly important for understanding why predation is such a complex process. Third, our ability to predict dynamics across systems was low. We conclude with a review of potential management applications of predator-prey ratio's and the assumptions required to understanding prey population dynamics.

IUGB 2013

O.LC.03

Realized habitat selection and space use by brown bears reintroduced to the Italian Alps

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KEYWORDS : carnivore conservation ; corridors ; least-cost path analysis ; resource selection functions

Reintroductions are often difficult and can result in increased dispersal and mortality of released animals. Especially landscape fragmentation poses a challenge to conservation biologists and wildlife managers. Connecting habitat patches that support occupancy is key to ensuring long-term population recovery for umbrella species such as brown bears (Ursus arctos). In 1999 the reintroduction project 'Life Ursus' was initiated and 10 brown bears were translocated from Slovenia to the Eastern Italian Alps (Adamello-Brenta) where the bear population was considered extirpated by the end of the 20th century. Here, we describe the habitat selection and space use patterns of reintroduced brown bears in Trentino, Italy, with the ultimate goal of identifying corridors between preferred habitat patches. We built annual resource selection functions (RSF) using generalized linear mixed-effects models with data from 6 bears fitted with GPS collars between 2006 and 2012 at the landscape and home-range scales. Then, integrating habitat selection, movement and landscape features we employed least cost path (LCP) analyses to empirically define regional movement corridors. Finally, we used Kappa-statistics to compare the realized habitat selection at the landscape scale with a habitat suitability model (HSM) developed to predict potential habitat prior to reintroduction.

At the landscape scale bears selected home-ranges at intermediate elevations in steep terrain. Habitat selection inversely correlated with road occurrence and human use landcover types, i.e. settlements, pastures and agricultural lands. Bears selected landcover types that provide forage, such as shrublands, deciduous forests, but also orchards. Within their home-ranges bears also avoided landcover types related to human use (especially bike trails, settlements and pastures). K-fold cross-validation indicated a high predictive capacity of our RSFs. We identified road crossings of movement corridors between preferred habitat patches throughout the study area; with higher densities in the south. A comparison of our LCP model with confirmed road crossings and locations of 5 collisions indicated good predictive capacity. When bears crossed roads they preferred shrublands or wetlands. The comparison between the predictive pre-reintroduction HSM and the realized habitat selection showed moderate agreement with highest agreement in settlements and agricultural lands. Spatial discrepancies resulted from the HSM predicting lower suitability in orchards and shrublands and higher suitability in mixed forests than the RSF.

Lastly, we provide recommendations for the management and conservation of bears in the Alps. The combined process-based approach of the RSF and LCP analyses aids to identify both potential habitat for brown bear settlement and corridors that will allow for settlement in the future. This approach also provides information on the biggest constraints to bear movements, such as the barrier created by the Adige-Valley. We make recommendations for urbanization, road design and improvements (e.g. overpasses), human recreation and the habitat suitability in different parts of the valley. We suggest verifying and monitoring the use of movement corridors with e.g. camera traps or DNA monitoring. Increasing awareness for key brown bear habitats and corridors and raising local acceptance of this species, especially in the interface between human dominated landscapes and wilderness areas, is necessary for brown bear conservation.

O.LC.04

Improving the study design of Eurasian lynx (Lynx lynx) monitoring from camera trap data

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KEYWORDS : density estimation ; forested areas ; monitoring guideline ; spatially explicit capture-recapture model

Camera trap monitoring of elusive and individually recognizable species coupled with capture-recapture analysis has become an ordinary tool in wildlife biology and conservation praxis. As density estimations constitute the basis for official management decisions and policy making, reliable estimations are of high importance. Nevertheless, there is a lack of standardized methods for camera trap monitoring that would secure robust estimations. This is of major concern, though, as parameters like study area size, session length, session season and amount of camera traps have all been shown to affect the outcome of such analyses. Within our study, we aim to optimize the study design for monitoring Eurasian lynx (Lynx lynx) in forest habitats by using camera traps. The goal is to deliver a stable amount and quality of data, while minimizing expenditure in material and manpower.
The Eurasian lynx is a cryptic species occurring in low densities which makes robust analysis of population dynamics challenging. We sampled data in Bavarian Forest National Park (BFNP) where we installed two opposing cameras on 60 sites systematically in a study area of 760 km^2 (BFNP + Šumava National Park) during three successive winters. Additionally 30 sites were maintained for two successive years on 240 km^2 (BFNP). This sampling revealed a number of at least 16 independent lynx. The data have been analyzed with spatial explicit capture-recapture models (SECR), which have currently moved into focus because of incorporating a spatial population model combined with an individual movement model. Thus, resulting density estimates are unbiased in terms of edge effects and incomplete detection.

To improve the study design of camera trap monitoring of Eurasian lynx we want to answer the three questions :
(1) HOW LONG should a camera trapping session last in days in order to maximize data quality while ensuring population closure?
(2) WHEN is the most adequate phenological phase of the year for the camera trapping session?
(3) HOW MANY cameras are needed at minimum to deliver robust data?
Our study will serve as a guideline for defining parameters of Eurasian lynx monitoring in European mountain forest areas and for developing monitoring designs for similar species and/or similar environments.

O.LC.05

Testing the risk of predation hypothesis : do moose change their habitat selection in response to recolonizing wolves ?

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KEYWORDS : anti-predator behaviour ; habitat shift ; landscape of risk ; resource selection

To avoid predation, prey make behavioral decisions to decrease the probability of being detected, attacked or killed by a predator. After being absent for more than 100 years in Scandinavia, wolves (*Canis lupus*) have naturally recolonized in areas of south-central Sweden that offer a unique opportunity to study the behavioral response of moose (Alces alces) to wolf recolonization. We used satellite telemetry locations from collared moose and wolves and used the K-select habitat selection method to estimate if moose habitat selection was affected by predation risk based on wolf utilization distributions. Moose habitat selection was influenced by reproductive status and time of day and showed a different selection pattern between winter and summer, but there was only weak support for that moose habitat selection responded to variation in predation risk. More specifically, our results did not support earlier studies showing prey avoidance of more risky habitats in relation to predation risk, furthermore this pattern was consistent independent of sex, reproductive status and time of the day. The seemingly weak response of moose changing habitat selections as a response to predation risk found in our study may have several underlying explanations which are not mutually exclusive from the long term absence of non-human predation pressure including 1) intensive human harvest during the last century is a more important factor affecting moose behavior than wolf predation; 2) moose have still not adapted to the recolonizing wolf; 3) responses may include other behavioral adaptations or occur at a finer temporal and spatial levels than investigated in this study.

O.LC.06

Attitudes toward large carnivores and acceptance of illegal hunting on the Scandinavian Peninsula

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KEYWORDS : human-wildlife conflicts ; large carnivores ; poaching ; potential conflict index

Species and ecosystems are under a continuous pressure from a rapidly growing human population. Conservation of wildlife and endangered species; i.e. large carnivores, is not only related to criteria such as appropriate habitats, but also to people's willingness to preserve the actual species. In this study we have used a geographically stratified sampling scheme where we have asked 4-5 persons in every municipality in Norway and Sweden about their attitudes toward large carnivores (bear, lynx, wolf, wolverine). Searching for large scale spatially dependent dimensions of attitudes is somewhat contrary to conventional social science work in the wildlife field adding a novel perspective to the conflict.
We discuss certain social values associate with different attitudes toward large carnivores and also present how acceptance of poaching is geographically distributed. Part of the conflict is also related to the disagreement between people (measured as Potential Conflict Index; PCI) due to whether or not people accept large carnivores in their own country or in their neighbourhood area. There is also disagreement around accepting more extreme actions such as illegal hunting to prevent establishment of large carnivores. We revealed significant differences in people's attitudes towards illegal hunting between Norway and Sweden, and also found differences in acceptance of large carnivores associated with traditions such as big game hunting and sheep husbandry. In general acceptance of carnivores and illegal hunting was independent of carnivore abundance.
To our knowledge this is the first time attitudes towards poaching and level of consensus within larger regions has been measured at this scale in Scandinavia.

O.LC.07

Exploitation of large carnivore damage prevention measures in Estonia : guidelines for coexistence with humans

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KEYWORDS : co-operation ; conservation ; LGD ; wolf

The aim of the study was to explore the large carnivore damage preventive measures used in Estonia and compare them to Finnish preventive measure framework. In both countries have been used varieties of technical means, Livestock Guarding Dogs (LGDs) and the integrated mixes of different measures.
The methods of the study included analysis of the applications for damage compensation and on-site inspection reports obtained by the Environmental Board of Estonia. The research data included all applications for damage compensations claimed by farms in Estonia. The data was at first classified into three preventive measure groups : A. Frightening measures /Deterrents, B. Fences and C. Other measures e.g. use of LGDs or keeping animals in shelters at nights. Next it was formed a three level codification on the basis of the existence and use of the measure : a preventive measure in use during the damage (2); a preventive measure existing at the farm, but not in use during the damage (1) and no reported preventive measure at all (0). I.e. if damage happened and the fence was broken or it did not surround the whole pasture, the preventive measure was coded as (1). Subsequently was continued the analysis of used measures and those applications, which contained preventive measure(s) in use. Characteristics of the injured livestock, pasture types, geographical and risk differences were considered. Semi-structured interviews to farmers and other stakeholders as well as on-site-visits to farms in Estonia and comparative interviews in Finland were also used.
The results of the study showed that the damage compensation claimants' definitions of preventive measures used in the practical contexts at Estonian farms varied from radio sounds to metallic net fences or multiple strand wires integrated electric fences for sake of crawlers. The large carnivores reported on inspection reports, were wolf (Canis lupus), bear (Ursus arctos) and lynx (Lynx lynx) (shares e.g. in 2010 approx 65%, 30% and 5% respectively). The amount of reports increased : 59 (2007), 89 (2008), 99 (2009) and 165 (2010). On the basis of compensation claim reports, it seemed that the possibility to increased prevention efficiency was notable. The share of without reported prevention measures varied between 20%-30%. The interviews supported the possibility of enhanced efficiency, if the costs, usability and quality of measures could be developed towards better suitability to the practical context at the farms. This in turn may change the negative attitudes of people to carnivore presence less negative (cf. Karlsson & Sjöström 2011). In Estonia likewise in Finland hunting of large carnivores was mentioned as a rule-based measure of controlling the size of the damages and population. However, the influence of hunting as preventive measure is still difficult to predict keeping in mind the behaviour of the surviving carnivores especially concerning wolves. Further research of damage prevention measures in different contexts and the guidance of their use as well as cooperative and incentive processes between stakeholders will be needed to enhance both humans well-being at farms and animal welfare.

O.LC.08

Diet of wolves and selection of wild ungulates in an area of Northern Italy

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KEYWORDS : Canis lupus ; Northern Apennines ; prey selection ; scat analyses

The trophic ecology of wolves was studied in a mountainous area of the Italian Northern Apennines from 2007 to 2012. We defined the selection process of wild ungulates to highlight seasonal variations in dietary habits of the wolf in relation to prey abundance. During the study period we collected wolf scats and recorded signs of prey and competitor presence along a network of transects randomly chosen and representative of the different habitats in the area. The results of this study were expressed as frequencies of occurrence and mean percent volumes of prey species. We analysed wolf scats to identify the main food groups consumed by the predator in every season and we compared the proportions of biomass of wild ungulate species in the diet with those calculated with the signs of presence. Annual and seasonal variations in mean percent volumes of food categories and wild and domestic ungulate species were analyzed using non-parametric multivariate analysis of variance. We calculated Levins' B index to assess wolf diet breadth; in particular, the index was calculated for every season summing up years and for every year summing up seasons. In order to assess the pattern of selection of wild ungulates we calculated the Manly a index. We observed a decrease of diet breadth in the study period, with an increasing use of wild ungulates and a decreasing consumption of livestock, depending on the increase in the availability of wild prey species. Significant seasonal variations were observed in trophic habits of the wolf, but generally there was a wide use of wild ungulates (63.6% in volume summing up years and seasons), especially >1-year-old wild boars. Livestock (20.6% in volume summing up years and seasons) was mainly taken in summer, which corresponds to the period of greater presence of domestic ungulates on pastures. The analyses of selection patterns showed that wolves use either the available prey species, exploiting each species in relation to its abundance and accessibility. Considering the four years of study, it is possible to hypothesize the existence of functional responses of wolves to changes in abundance of the main prey species. The highlighted change in wolf diet, towards a greater use of wild ungulates and a strong decrease of the impact on animal husbandry, is an important step in the process of recovery and conservation of the wolf.

TECHNICAL CONTRIBUTION

Field ID Manual : A systematic approach in field investigation of ungulate predation and assigning a standardized probability by predator species to a predation event.

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Wildlife professionals are challenged with increasing public expectations for ecologically-based management and conservation driven by diverse values, while also developing wildlife management and restoration strategies that work in predator-rich environments. However, there is a lack of consistency in classifying a predation event or the event is inaccurately classified due to a lack of training or experience, both can strongly mislead research and management results and conclusions. The weight or preponderance of evidence is used to classify the probability of predation, but the lack of standardized methods make comparisons between research/management projects difficult to impossible.

This manual describes a systematic approach for field investigation. It also provides diagnostic keys that standardize a probability of predation using five categories, and based on these categories, to systematically classify the predation event by predator species. Killing strategies and carcass consumption characteristics are presented for eight widely distributed North American predator species.

THEMATIC SESSION

Harvest management of waterbirds

Co-convened by Wetlands International & the African-Eurasian Migratory Waterbirds Agreement AEWA (Bonn Convention), sponsored by FACE

The Waterbird Harvest Specialist Group (WHSG) can trace its origins back to the IWRB "Hunting Research Group" which was founded in 1969, it later became the Wetlands International "Waterbird Hunting Specialist Group". It is now being reconstituted with the purpose to support science-based decision-making concerning the harvest of waterbird populations to ensure that their use is ecologically, socially and economically sustainable. The need for the work is actualized by recent developments in for example the African-Eurasian Waterbird Agreement (AEWA) to promote adaptive harvest management and work under CBD and IUCN to develop a collaborative partnership on sustainable wildlife management. With this workshop and event the Waterbird Harvest Specialist Group will launch its new start and present its purpose and scope of work for the coming years.

Expected outcomes :

- Launch the reconstitution of the Waterbird Harvest Specialist Group
- Highlighting aims and priorities for its work in the coming years
- Provide topical examples of classic and new approaches to harvest management
- Exchange of views on waterbird harvest management policy needs

Session 1: 14:00-15:30
Session Chair: Jesper Madsen

Alexey Sergeyev - *Lead shot ingestion in birds in Russia*
Julia Newth - *Illegal shooting of migratory swans and an initiative to address the issue*
Peter Glazov - *Geese spring staging areas in Central European part of Russia: conditions and conservation problems*
James Williams - *Stakeholder perspectives when setting waterbird population targets: Implications for flyway management within Europe*
Flemming Merkel - *Baseline for co-management of eiders in West Greenland.*

Session 2: 16:00-17:30
Session Chair: Angus Middleton

Jean-Yves Mondain-Monval - *Waterbird Harvest Group a long migration*
Fred Johnson - *Learning and Adaptation in the Management of Waterfowl Harvests*
Nils Bunnefeld - *Fishing for new approaches to sustainable hunting*
Sergey Dereliev - *Policy Needs and Framework for Harvest Management within the AEWA Range States*
Jesper Madsen - *Re-launch of the Waterbird Harvest Specialist Group*

INTRODUCTORY PRESENTATION

Harvest management of waterbirds - reconstituting the Waterbird Harvest Specialist Group

Jesper Madsen
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The premise of sustainable use of populations is fundamental in national and international legislations, conventions and agreements related to the conservation and management of waterbirds. However, defining and assessing sustainable use of waterbirds is an inherent challenge as they often cross several national territories with ecological, political, economic and cultural differences, and are subject to different types and motivations for harvesting. Moreover, the status of quarry populations range from endangered to burgeoning, calling for case-specific treatment. Generally our ability to monitor populations and harvest levels has been inappropriate to evaluate the effect of harvest on populations and the lack of internationally coordinated monitoring systems and flexible management instruments remains a hindrance for the effective management of waterbird populations. Today, we launch the reconstitution of the Wetlands International, Waterbird Harvest Specialist Group with the overarching purpose to support science-based decision-making concerning the harvest of waterbird populations to ensure that their use is ecologically, socially and economically sustainable. Given the complexities, scale, risks and massive uncertainties involved, this is a high ambition, and the WHSG will primarily serve as a global forum for sharing knowledge and practical experience on waterbird harvesting. In order to progress the issue the practical work will be organised according to the major flyway instruments. Given the background and current knowledge and practice the initial focus will be on the Agreement Area of the African-Eurasian Migratory Waterbirds Agreement (AEWA). This area encompasses a wide range of harvest and governance regimes for shared populations. In addition this area has a useful policy framework, AEWA, through which to structure clear deliverables. Notwithstanding this, the work of the WHSG will still be informed by policies, processes and issues in other flyways, and in covering such a diversity of regimes will in itself provide guidance for other flyways. It should therefore be clear that the WHSG will remain open to all initiatives that can contribute to the overall purpose of the WHSG.

O.WB.01

Stakeholder perspectives when setting waterbird population targets : Implications for flyway management within Europe

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KEYWORDS : adaptive management ; conservation targets ; pink-footed goose ; stakeholder engagement

Managing and controlling wildlife species within Europe is an acknowledged part of conservation management, nevertheless deciding and setting a widespread population target at an international level to control a population is perceived to be conceptually very challenging. We evaluated the perspectives of a variety of stakeholders in relation to controlling migratory waterbird populations, approached by posing the research question : What causes convergent/divergent perspectives when setting waterbird population targets? Interviews were conducted amongst 26 individuals within a variety of governmental and non-governmental organizations, all with an involvement in waterbird management. Analysing the perspectives of these stakeholders identified four key themes for consideration when setting population targets : 1) justifications for controlling a population, 2) population control but at what scale, 3) the acceptability of management actions and 4) aligning interests and gaining acceptance. Perhaps the most underestimated element of current approaches for waterbird management and population control in Europe is the process of decision making, whereby justifying the reasons for control, then defining and setting targets is just as important as to what the final targets are. To achieve ecologically and socially sustainable strategies for the management and control of waterbird populations within Europe it is suggested that engagement with stakeholders at multiple levels is needed to engender decision making that, whilst based on factual scientific knowledge, is open, transparent and able to account for alternative viewpoints and sources of knowledge and skills. Further work is needed to develop the institutional capacity and structures that can employ interdisciplinary approaches to engage stakeholders in the necessary decision making, implementation and continued adaptation of management plans.

O.WB.02

Geese spring staging areas in Central European part of Russia : conditions and conservation problems

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KEYWORDS : degradation of agricultural land ; migration of geese ; spring stopovers

Trophic factor plays the leading role in forming of migration routes. Migration routes pass through the most environmentally friendly places where migratory birds can find enough food and place for their rest during their stopovers.
For the several centuries geese's stopovers have been connected with agricultural land. Transformations of these landscapes and changes in land use have a significant effect on geese migration.
Degradation of agricultural land and unregulated hunting are the key factors reducing the number of geese on the spring stopovers. As a result of changes in the spatial structure of agricultural land use mass stopovers of geese on the spring migration were changed. Some of the protected areas established in the 1970-1980s do not ensure full protection of the main concentrations of geese nowadays.
Field studies in frame of Dutch-Russian 'SPRING' project (MATRA, The Netherlands) are carried out in the Upper Volga region (2008-2012 years) (Yaroslavskaya, Vladimirskaya, Ivanovskaya and Kostromskaya regions) and in the last three years in Moskovskaya and Belgorodskaya regions.
Widespread degradation of feeding and resting habitats of geese is a common problem in the Upper Volga region. In recent years geese concentrate nearby big cities and industrial centers where soil fertilization creates good feeding conditions in spring time. During last 20 years the sown areas were reduced by 1,7 - 2,5 times in the Upper Volga region. It reflects general situation in agriculture in the European Russia. Decrease of agricultural production and reducing of sown areas results in deterioration of geese food supply in spring.
We observed permanent concentrations of geese only on the territories which have conservation status, where hunting is prohibited and where there is no disturbance. Birds need areas where they can safely eat and relax. Currently the network of regional reserves and zones of peace game, which existed in the Soviet Union, is reduced. Most of them were created on the initiative of local hunting associations. These territories have always played a very important role in preserving and maintaining biodiversity of a region. Nowadays zones of peace game are well preserved either traditionally or historically or in hunting grounds with good game management. To improve the efficiency of hunting geese the key factors are creation of peace zones and biotechnical activities. Competent game management can be an effective tool in the conservation of biodiversity in the region.
To study the structure of the geese flyways a ringing program was started in the Kostroma region (Kologriv). During four years (2008 - 2011) 238 white-fronted geese were caught and ringed. Recites of rings were received from the Netherlands, Germany, Belgium, Denmark, Poland, Estonia and Bulgaria. Annually we see birds ringed before and that proves constancy of the stopovers on spring migration. There exists a real need to expand areas of banding and monitoring of marked geese in Russia and Eastern Europe.
The development of programs promoting the observation of geese and recites neckbands is necessary. For these purposes, the site http://www.rusgeese.ru/ for birdwatchers and hunters has been created.

O.WB.03

Lead shot ingestion in birds in Russia

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KEYWORDS : mallard ; poisoning ; waterfowl

First reports about lead shot in gizzards of ducks in Russia began to arrive from hunters about 1960th, however first scientific study was in the late eighties.
Lead shot ingestion researches take places only in three regions of European Russia and one region of Siberia, waterfowl lead pollution were investigated In four regions of European part, one of Ural and one region of Far East.
The cases of lead shot ingestion were recorded in waterfowl and upland birds : *Cygnus cygnus, C.olor, C.bewikii, Anas platyrhynchos, A.acuta), A.crecca, Aythya fuligula, A.marila, Polysticta stellery, Melanitta fusca, Bucephala clangula, Fulica atra, Grus leucogeranus, Tetrao urogallus* (Degtyaryev,1996; Sergeyev, 2004; Eskov, Kiryakulov, 2012). Cases of lead shot ingestion at birds of prey and owls in Russia still unknown.
The prevalence of lead shot ingestion in waterfowl bagged in European part of Russia was not very high : 2.5% in Kirov region (39 individuals of 5 species of duck hunted in autumn, our data) and 1.09% of mallard (n=184) and 1.52% of different ducks and coot (n=263) hunted in autumn Moscow region (Kiryakulov, 2009). In Eastern Siberia (Yakutia) ingested shot was found in 7 waterfowl species of 21 sampled (n=1400). Prevalence of Pb shot ingestion vary from 0,1 to 28,8% in different parts of region and was as high as 21.6% in pintail and 21.4% in greater scaup (Degtyaryev, 1990, 1991).
Lead poisoning never was diagnosed as the cause of death in any waterfowl in Russia however as much as 452-1259 lead pellets was found in gizzards of 4 from 5 mute swans founded dead in South-East part of Caspian coast (Koshelev, 1990).
In gizzards of geese *Ancer fabalis* (n=38), Ancer albifrons (n=47) and mallard (n=35) hunted in Kirov region in spring 2005-2012 ingested shot was not found but 8.6% of mallard has Pb concentration (AA spectrometry detected) in liver higher than 2.0 mg/g ww and two mallard higher than 10.0 mg/g ww, indicated on lead exposure in past. Average and maximum concentrations of lead in body tissues of mallard were much higher than another game animal species.
In *Scolopax rusticola* bagged in springtime in Kirov region (n=18), ingested shot also was not found and Pb level was low and vary from 0.24 to 0.35 mg/g ww in liver and 1.0-1.3 mg/g dw in bones only one bird has 3.21 mg/g dw.
Despite a lack of studies it's not doubt that in Russia as well as in other countries the lead poisoning of waterfowl takes place. At the same time, there are not any regulations restricting the use of lead ammunition. Lead shot restricting projects offered by state structures are far from perfect, have no sufficient scientific substantiation and meet protests among hunters. For realize lead shot ban in Russia need at least 10-15 years.

O.WB.04

Illegal shooting of migratory swans and an initiative to address the issue

Julia Newth[1], Martin Brown[1], Eileen Rees[1], Baz Hughes[1], Cy Griffin[2], Angus Middleton[2]
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KEYWORDS : Illegal Shooting Project ; migratory swans ; shotgun pellets ; X-ray analysis

The migratory whooper swans (*Cygnus cygnus*) and Bewick's swans (*Cygnus columbianus bewickii)* have been protected by national and international legislation throughout their migratory ranges since the mid 20th century, yet illegal shooting of both species still occurs. X-rays taken of wild caught swans at several sites in the UK were inspected to determine : (1) the incidence of embedded pellets in live birds, (2) inter-specific differences in the level of illegal shooting, and (3) trends in the prevalence of shot-in pellets between the 1970s and the 2000s. A significantly higher proportion of Bewick's swans (31.2%) contained shot-in pellets than whooper swans (13.6%). The likelihood of a bird having been shot increased with its age for both species. The proportion of Bewick's swans with embedded shot was higher during the 1970s and 1980s than in the 1990s and 2000s but the incidence remains high, with 22.7% of Bewick's swans X-rayed in the 21st century containing shot. The prevalence of whooper swans with embedded shot did not change significantly over time (14.9% with pellets in the 1980s compared with 13.2% with pellets in the 2000s). Illegal shooting is of particular conservation concern for the Bewick's swan population because its numbers declined by 27% between 1995 and 2005 and national trends indicate that numbers have continued to decline since then. International collaboration is required for the successful reduction of shooting of migratory swans, as demonstrated for other hunted species, particularly as adherence to national and international legislation is likely to vary between countries. In response to these concerns, the multi-partner Illegal Shooting Project was established in 2011. In collaboration with members of the hunting and farming community, conservation groups and governmental and non-governmental agencies, the Project aims to reduce the illegal shooting of both species across their flyways by : (1) understanding the range of issues leading to the illegal shooting of these migratory swans and identifying potential hotspots of shooting activity, to determine best practice for addressing the issue, (2) improving awareness of both species, the threat posed to them by shooting and legislation protecting the species within relevant communities, law enforcement bodies and authorities across the birds' respective flyways, in order to encourage greater engagement in addressing the issue, (3) encouraging 'ownership' of the issue by stakeholders across the flyways, and (4) encouraging greater enforcement of protective legislation across the flyways. Information gathered on perception of the levels of illegal shooting along the flyway is also described, together with the initiative to address the issue. Input on potential ways to reduce the illegal shooting of migratory swans would be welcome.

O.WB.05

Learning and adaptation in the management of waterfowl harvests

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The U.S Fish and Wildlife Service adopted a formal framework for adaptive harvest management (AHM) in 1995 after a controversial regulatory experiment , an unpopular Environmental Impact Statement, and a period of restrictive hunting regulations had severely eroded the collegiality important to collective decision-making. Today, AHM remains one of the few large-scale, successful efforts to apply the principles of adaptive resource management. In some ways, the regulatory process prior to 1995 was 'pre-adapted' for the evolution of an adaptive approach. The extensive program of waterfowl research and management in North America has long been recognized as unparalleled among conservation programs in terms of its scope, complexity, and cost. AHM was and is viewed as the best means for capitalizing on available information to make regulatory decisions, and as a systematic process for resolving longstanding uncertainties and disagreements about the effects of hunting regulations on waterfowl populations. After almost two decades of implementation, key management uncertainties persist, but AHM has achieved its initial purposes : to embrace competing hypotheses of system dynamics, to weight them based on the available evidence, and to modify harvest strategies by relying on a comparison of predicted and observed management outcomes. In the long run, however, perhaps one of AHM's greatest contributions will be in its capacity to compel managers to periodically reexamine their purposes and rules of operation. Referred to as double-loop learning, this critical self-examination is difficult because institutions have to acknowledge deficiencies in their processes and policies and because the search for solutions usually causes conflict. This is where the management enterprise now finds itself, and the key challenge facing harvest management is whether AHM as an institution can be sufficiently adaptive, and whether the knowledge and experience gained in the application of AHM can be reflected in higher-level policy decisions.

THEMATIC WORKSHOP

Wildlife conservation and management : The role of traps and trapping

Under what conditions should trapping of mammals be permitted, and what mechanisms are available to assess and improve trapping standards. Before answering these questions it is necessary to understand what 'trapping' is today, how traps and trapping practices have evolved, and how it is regulated.

In most EU Member States, the authorisation to hunt also includes the right to trap certain mammal species. Traps are used in virtually every country in the world for wildlife interactions in some way. This may be to minimise environmental damage or to assist conservation by helping to control over-abundant or non-native species or for relocation. It is an equally valuable research method, for example, to fit individuals with marks or transmitters to follow their movements. Since many of these species are predominantly nocturnal, or are present around buildings or settlements, trapping is often the safest method to restrain the animals. Regardless of the purpose for trapping or whether mechanical live-capture or killing devices are used it is important that all efforts are made to ensure a high standard of welfare for the trapped animals and to ensure that any non-target captures are minimal.

The workshop will provide a broad overview of current regulations at national and international levels with a focus on the AIHTS (*Agreement on International Humane Trapping Standards*) and how its provisions and sharing of best trapping practices can be applied. It will also provide an opportunity to present advances in trap testing technologies and trapping methods that have evolved trap design and regulatory provisions around the world, and consider how these could be applied in other areas.

Expected outcomes :

- Raise awareness on the scope of the AIHTS and related programs, and their implications for trapping practices
- Highlighting examples of best practice in the use traps for a range of applications (conservation projects, research, wildlife management, sustainable use)
- Exchange of view on mechanisms to ensure a high standard of welfare for the trapped animals

O.TR.01

Trapping in light of a proposed ban

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KEYWORDS : outdoor recreation ; predator control ; wildlife use

Trapping of medium sized predators can decrease predation on endangered, domestic and game species, and provide outdoor recreation. The objective of this study was to profile trapping of red fox (*Vulpes vulpes*), European badger (*Meles meles*), European pine marten (*Martes martes*), American mink (*Neovison vison*), corvids (the crow family) and gulls (*Larus spp.*) in Sweden. During the last 200 years trapping have been increasingly more regulated and narrowed to fewer species and techniques. Recently, the third largest party in the Swedish parliament -the Swedish green party - proposed banning trapping, except for scientific studies and pest control, because of animal suffering. In Sweden, trapping of red foxes, badgers, gulls, and corvids is restricted to cage traps (live traps). However, in the northern part - where about 25% of Swedish hunters live - leg-hold snares for red foxes is also allowed. Martens and minks can be trapped using either cage or killing traps. Although there are yearly estimates on how many wild animals that are harvested in Sweden, there is no record or previous research showing prevalence of trapping. Consequently, there is little knowledge of which hunters who trap and their motivation behind it. It is therefore difficult to make any prediction of what consequences a ban may have. We hypothesize that trapping is related to age, gender, location, evaluative beliefs about predator numbers, and number of hunting days of predators' prey species. In 2009, we sent a questionnaire to a random sample of 300 hunters in 20 counties, and to 600 hunters in one county (total = 6600 questionnaires). Respondents were chosen from among those who had purchased a hunting license in the season 2008/2009, and we used a four contact postage scheme. We received 3875 usable questionnaires (response rate = 62%). Responses were weighed so they represented a national sample. Of the respondents, 18% had engaged in trapping of at least one of the focal species and that corresponds to about 50,000 hunters. In the paper we discuss animal welfare, cultural aspects, attitudes towards trapping, and consequences of a future ban.

O.TR.02

Comparison of traditional jaw type killing traps and modern cable restraints to capture foxes

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KEYWORDS : AIHTS ; capture efficency ; fox control ; selectivity test

The red fox (*Vulpes vulpes Linnaeus, 1758*) is probably the most common target of predator control for reasons of wildlife management and conservation, protection of livestock, and interests of public health. In Hungary, successful fox culling strategies rely more and more on intensive springtime trapping carried out by gamekeepers. The majority of trap operators use the 56 centimetre 300 Newton and the 70 centimetre 500 Newton *Schwanenhals* jaw type bodygrip traps manufactured by *Fallenbau Weißer* in Germany. Both sized quick kill traps are equipped with pull activated trigger mechanisms, and are highly selective for canids when the trap and bait are likewise covered by a relatively thick (5-10 centimetre) layer of earth. For safety reasons, and to avoid accidental killing of non-target species, the Schwanenhals traps are not applicable close to populated areas and roads; on pastures, where herding dogs are used; or where densities of protected mammalian predators are higher than average.
In order to provide low risk alternative for operators, modern cable restraint devices, the *Collarum UK Fox Model*, and two traps already certified for red fox according to international humane trapping standards, the *Bélisle* No 6 and the *Bélisle Sélectif* are being tested for selectivity and capture efficiency in conjunction with traditional jaw type killing traps at multiple sites through the spring of 2013.
During writing of this abstract the field testing of traps is under way, and the results remain to be seen.

THEMATIC WORKSHOP

Managing wild boar in human-dominated landscapes

In many countries, wild boar populations have expanded dramatically in recent decades, both in numbers and in their geographical extent. This increase is due to a wide variety of causes, such as changes in agricultural practises (e.g. increased maize production), abandonment of human activity in rural areas, climate change, reduced hunting pressure, to mention but a few factors. The expansion of wild boar populations has also coincided with a period of intense urbanisation, both of the landscape and of society in general, and as such this species is now present in hitherto unoccupied areas with a high human presence, exploiting often rich habitat resources in and around cities and towns, and generally in close proximity to residential areas throughout the countryside. Also, effective refuge areas are often provided by nearby protected nature and recreational areas.

Wild boar presence in these areas is a growing source of conflict either because of undesired direct contact between people and wild boar, due to collisions with vehicles, damage caused to local crops and gardens, general nuisance, etc. Increasingly, due to the specific urban and residential contexts of these conflicts, traditional hunting methods are either limited or not available as an option for controlling wild boar due to high human presence, legal restrictions, public opposition to hunting, etc. In such case, alternative approaches will also be required in order to manage wild boar populations and mitigate conflicts between wild boar and people.

Expected outcomes :
The aim of this workshop is to highlight the growing problem of wild boar presence in the human-dominated landscape which now characterises much of Europe and other continents and to address the conflicts which arise from this presence and how best to deal with them. The results from an international survey* on this matter will provide recent background information as an introductory presentation for further discussion.

O.WSU.01

Probing wild boar population trends under adaptive management in Collserola Natural Park, Barcelona

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KEYWORDS : hunting ; indicators ; peri-urban ; trends

In recent years wild boar populations have been expanding in close proximity to many urban and residential areas where their presence is of growing concern to citizens and administrations. As such, diverse measures are being applied both to control the abundance of wild boar and to mitigate the varied conflicts they cause. Information on the population trends of game species is usually obtained from the analysis of hunting returns, using more or less standardised methodologies. However, such data may be deficient in peri-urban areas where hunting is often either restricted or prohibited. Also, management practises are still undergoing a period of adaptation in response to the recent arrival and growing numbers of wild boar in peri-urban areas. As such, the monitoring of population trends can be further complicated by changing animal abundance combined with changing management scenarios. In Collserola Natural Park (Barcelona), wild boar have been hunted in organised battues for some 20 years, but a sharp increase in their abundance during the last decade has meant that a growing proportion of wild boar captures are now obtained using alternative methods (night waits, live captures, etc.). Also, the hunting management system has changed during this period from a mostly private to a mostly public system. This situation complicates discerning real population changes and the possible effects of adaptive control methods and management practises, but it also provides additional parameters for probing trends. Apart from hunting returns, in Collserola Park data are also available on live captures of wild boar in urban areas, as well as for roadkills, and information obtained during night transects provides further indication of population levels. Through correlation of independent parameters, this study indicates that trends obtained from hunting returns can still be useful for population monitoring under adapted management in peri-urban areas, and it highlights the possible utility of alternative indicators where such returns are either deficient or unavailable under such settings.

WORKSHOP

The duty of care for animals : How relevant is the context of use ?

Chair : Frauke Ohl

Animal welfare issues are a matter of intense societal and political debate but have generally tended to be focused primarily on laboratory animals, companion animals or farm livestock. Welfare issues, however, do not only occur in the context of closely-managed animals (whose environment is strictly controlled by human activity), but may also arise in situations in which animals are living more freely, but under human responsibility, such as in nature conservation areas, or are understood as truly 'wild' animals. It is clear that there is increasing pressure from society to explore what may be our responsibilities for the welfare of free-ranging animals, especially where they are clearly impacted on by human activities (habitat alteration, habitat fragmentation etc) or are exploited as game species.

Legal frames with respect to animals are clearly context-dependent, that is to say that specific rules are applied when using animals for production, companionship, experiments, or when animals are not used for specific purposes ('wild' animals). From a legal point of view, there may thus be a distinction between responsibilities towards farm animals, lab animals, companion animals, closely managed wildlife, and truly wild animals experiencing little management input. But on what is this distinction based and : is it justified to relate our duty of care to such contexts? Notably, society's attitudes to a given species may differ with context : thus the value accorded even to the same mouse might depend on whether that mouse is child's pet, a laboratory animal or a pest. Yet this is clearly inconsistent : as Webster (1994) argued : *'a rat is a rat whether we define it as vermin or as a pet'*.

In the UK and especially Scotland, first approaches have been undertaken to establish national frameworks for wildlife management and to define responsibilities of managers specifically for welfare, as well as to establish guiding Codes of Practice for wildlife management practice (Scottish Government 2008; Scottish Natural Heritage 2011; Defra 2010). In The Netherlands, recently an intense societal and political debate developed around the question of the duty of care of managers to safeguard the welfare of free-ranging grazers in a nature conservation area.

The aim of this workshop is to consider how we may extend principles of welfare so that they may be consistent and independent of context - and to explore specifically how they might be applied in measurement and management of welfare in wild animals. We will explore general principles of what we mean by welfare and what measures might be available to assess welfare status of wildlife. Because many management measures act at the population level we will explore what might be appropriate measures for assessment of welfare status at the level of the individual and the population and also discuss how managers might assess the likely impact on individual or group welfare of given management actions such as hunting.

Expected outcomes :

- clear definition of what is implied by welfare of individuals or populations when applied to free-ranging wildlife species
- preliminary protocols for possible measures which might be adopted in assessment of welfare status of wildlife
- development of fareworks within which to assess likely welfare implications of human management actions (whether management actions explicitly directed at improving welfare status, or actions whose primary objective is unrelated to welfare, yet may have an incidental impact)

WORKSHOP

Large-scale animal ecology and management : Integrating large GPS- Telemetry-datasets across multiple animal populations

The development of GPS-collars for large and medium sized animals over the last decades opened up many new possibilities to study these animals. One of the main advantages of this technology is the possibility to remotely collect large sets of standardized localizations, using short-time intervals without disturbing the animal, facilitating the possibility to localize animals 24/24 hours. Especially the standardized nature of GPS datasets have naturally lead to the ability to aggregate data over multiple populations to address both fundamental and applied questions in animal ecology. In particular, location datasets can be enriched by other sources of information of the ecological process, at the individual (e.g., survival), population (e.g., density) or landscape level (e.g., environmental covariates).

However the large amount of data also poses new challenges for treating and analyzing these datasets. Given the fact that many researchers all over the world are facing this same challenge opens up a unique possibility to work together and look for common solutions for these problems using and developing open-source software applications.

The collaboration on the use of GPS-data by researchers all over Europe working on roe deer (EURODEER, www.eurodeer.org) showed such fantastic opportunities in practice; ; by integrating GPS-telemetry data in one big standardized database, including many metadata, and linking them to habitat data, large scale analysis over gradients from north to south and east to west Europe became possible and previous impossible research questions are now being investigated.

During the workshop we will start our exploration of future possibilities for collaboration and research by presenting two cases of the use of multi-population, large scale datasets of GPS-telemetry and other individual based data from two different continents; EURODEER (given by Francesca Cagnacci) and two North American examples (given by Mark Hebblewhite). Inspired by these presentations we would like to discuss the following topics :

Expected outcomes :

- is there the interest to broaden the Eurodeer experience to other species ?
- is this technically demanding?
- are there barriers to collaborating across projects and countries?
- what urgent management issues and ecological questions can be best addressed at larger spatial scales than traditional localized studies?

WORKSHOP

CAP 2020 : a wildlife friendly policy ? Opportunities at member states level

2013 is the year of a great change in the European agricultural policy. After a wide-ranging public debate, the Commission presented on 12 October 2011 a set of legal proposals designed to make the CAP a more effective policy "for a more competitive and sustainable agriculture and vibrant rural areas". Reacting on the Commission's proposition on the new CAP to better address, besides socio-economic objectives, climate change and sustainable management of natural resources, the workshop aims to answer to the following questions :

- What will really change for wildlife?
- Is it a sufficient contribution to the EU objective of reversing the decline of biodiversity in farmlands?
- What more can be done at EU or Member State level within or out of the CAP to enhance farmland wildlife (good examples across EU) ?

Five short talks will enhance the debate. The first one will give an overview of the wildlife friendly measures of the new CAP, focusing on birds, game and non-game species. The others will aim at evaluating the effectiveness of the CAP2020 regarding the objective of enhancing farmland wildlife and screening what can be done outside of the CAP framework.

Expected outcomes :

- An analysis of the implications of the new CAP on wildlife and wildlife management.
- Guidelines for member states to take the best advantage of the framework set up by the CAP.
- Recommendations for supporting wildlife friendly forms of agriculture.

Keywords :

CAP 2020, farmland, wildlife, natural resources, agriculture, agroecology

Speakers (confirmed) :

- Martin SCHEELE, Head of Unit, Directorate "Environment, Genetic resources and European Innovation Partnership", DG Agriculture and Rural Development, European Commission
- Pekka PESONEN, Secretary general, COPA-COGECA
- Valérie OO DE BEECK, Agriculture Policy Advisor, Via Campesina
- Pia BUCELLA, Director, Directorate "Natural Capital", DG Environment, European Commission
- Philippe BARET (tbc), Professor, FNRS Interdisciplinary Research Group for Agroecology, University of Louvain (B)

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Abstracts
Posters

Interactions Humans-Humans

P.HH.01

Acceptance of management techniques in Norway

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KEYWORDS : cultural inheritance ; protected carnivores ; reindeer ; sheep

The Norwegian government has passed a resolution to secure the survival of the five large carnivores; brown bear, wolf, wolverine, lynx and eagle. There are in various degree endangered species in Norway who has signed international agreements to secure the national stock of each of them.
Keeping livestock and carnivores in the same area are bound to cause conflicts, as it is not possible to have hunter and prey in near proximity without experiencing loss. In an attempt to prevent too much damage to livestock such as sheep and reindeers out on mountain pasture, the Norwegian management agencies have divided the outfields into areas where protected carnivores are prioritized and areas where livestock on free pasture are prioritized. The division is however not absolute, and in many areas there are farmers trying to adapt to the risk of carnivore depredation.
The management agencies are trying to handle the situation by financing management techniques designed to reduce both the conflict and the loss of livestock. They are also paying compensation for each documented loss of livestock to the protected carnivores.
Despite the great amount of resources used on management techniques and compensation each year, there is a heated conflict between different groups of interest. The degree of acceptance of the financed management techniques varies with how adoptable each technique is to the traditional methods of the industry. In evaluating the degree of various acceptances of different techniques, it is important to look at the cultural inheritance and traditions that follows both sheep farming and reindeer husbandry.
The sheep are out in the mountains during most of the summer. The farming methods are adapted to times when stock of carnivores were low and constituted no real risk. The methods has marked the way we see our Norwegian nature with a traditional, cultural landscape where sheep roam free and create an open and passable landscape.
The so called ‘semi-domesticated’ reindeers are mainly a Sami tradition and are as such protected as an indigenous cultural inheritance. The reindeers are out all year and are traditionally only gathered for slaughter and branding.
Bioforsk - Norwegian Institute for Agricultural and Environmental Research, have evaluated the management techniques financed by Norwegian management agencies. The goal of the evaluation was to see how effective the management techniques are and in what degree the industry believes in the techniques they are recommended.

P.HH.02

Wildlife estates label : a tool for promoting good practice for sustainable hunting

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KEYWORDS : charter ; Europe ; principles ; showcase

The Wildlife Estates Label (WE) is a tool for sustainable land use and wildlife management. It operates according to agreed principles for environmentally appropriate, socially beneficial and economically viable, land management. The label aims to establish a network of exemplary estates. These will showcase simple principles of good management and conservation of wildlife estates all over Europe. They are adapted according to the different types of hunting management in the various biogeographical regions of Europe.
The Walloon region's (Belgium) evaluation grid is based on the principles of the *'European Charter on Hunting and Biodiversity'* (Council of Europe / Bern Convention). This Charter represents a two years collective effort of Governments, hunters and environmental organisations. It promotes principles and guidelines intended to ensure that hunting in Europe is practiced in a sustainable manner, while avoiding negative impacts on biodiversity and making a positive contribution to the conservation of species and habitats and the needs of society.
In practice, the evaluation of an estate is based on 5 elements, following a standardised methodology :

- a brief description of the estate, by its owner or manager;
- a detailed description of the manager's aims for his estate;
- a description of the management measures implemented according to the 12 principles (Box 1) of the *European Charter on Hunting and Biodiversity*;
- a visit of the estate by a mandated evaluator;
- a notation of the management practices of the estate by the same evaluator.

The application is then sent to the *International Jury,* with an accompanying note providing the evaluator's assessment. The Jury will decide, twice a year, on the attribution of the 'Wildlife Estates' label. This label is given for a period of five years, renewable. Today, more than 350.000 ha are labelled across Europe
BOX 1 : Twelve principles of the *European Charter on Hunting and Biodiversity* which the hunting managers commit to adopt
Principle 1 (15 pts) Favour multi-level governance that maximises benefit for biodiversity conservation and society
Principle 2 (20 pts) Ensure that regulations are understandable and respected
Principle 3 (70 pts) Ensure that harvest is ecologically sustainable
Principle 4 (50 pts) Maintain wild populations of indigenous species with adaptive gene pools
Principle 5 (60 pts) Maintain environments that support healthy and robust populations of harvestable species
Principle 6 (10 pts) Encourage use to provide economic incentives for conservation
Principle 7 (15 pts) Ensure that harvest is properly utilised and wastage avoided
Principle 8 (15 pts) Empower local stakeholders and hold them accountable
Principle 9 (30 pts) Competence and responsibility are desirable among users of wild resources
Principle 10 (30 pts) Minimise avoidable suffering by animals
Principle 11 (30 pts) Encourage cooperation between all stakeholders in management of harvested species, associated species and their habitats
Principle 12 (15 pts) Encourage acceptance by society of sustainable, consumptive use as a conservation tool

P.HH.03

The valued Maltese tradition of wild birds' live-trapping

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KEYWORDS : Malta ; tradition ; trapping ; wild bird

Birds' live-trapping in Malta is an old and honored tradition. Some historians date it back to the Arab rulers (870-1090 AD) because words such as *xibka* (net), *mansab* (trapping site) and *insib* (trapping) are of Arab origin, while others to the Roman era, when Maltese netted birds for the pot. Falcons were trapped on Malta by vertical nets (*paragni*) for use in falconry and during the rule of the Knights of the Order of Saint Johns' (1530-1798), such birds were sent annually as presents to the kings of France, Naples and the King of Two Sicillies. Migratory bird trapping was well established during the period of the Knights. In the first Maltese dictionary (1750) the 'trapping site' was defined as a place where nets were laid to catch migratory birds and sites for turtle dove, falcons, short-toed larks and pigeons were mentioned. Both clap and vertical nets were used at the time, while throw nets (*terrieha*) were used for quail. By Government Notice of 1911, all but clap nets were made illegal. Keeping birds in cages became popular in the 19th century and finch live-trapping became well established, also as cause or effect of this new fashion. During the 20th century till 2008, the main species pursued by licensed Maltese trappers were quail (*Coturnix coturnix*), turtle dove (*Streptopelia turtur*), golden plover (*Pluvialis apricaria altifrons*), song thrush (*Turdus philomelos*) and seven fringillid finches (chaffinch *Fringilla coelebs*, linnet *Carduelis cannabina*, goldfinch *C. carduelis*, greenfinch *C. chloris*, siskin *C. spinus*, serin *Serinus serinus* and hawfinch *Coccocthraustes coccothraustes*). Caught birds were never for consumption, but for keeping alive in captivity, for song, captive breeding and use as live decoys. Trapping is practiced by the use of clap nets no larger than 13.75 X 2.75 m, operated manually from a hide. Birds are attracted to trapping sites by live decoys, caged or tethered, and by use of mouth blown calls or other mechanical (but not electronic) calls. Trapping sites of approximately 50 m^2 are cleared of vegetation (not on garrigue), so nets can be laid. The design of each site is species specific and its location wind specific, so a trapper may use more than site according to prevailing wind direction.
This long-standing tradition was suspended when Malta joined the EU in 2004. There was a grace period until 2008 to phase out all live bird trapping, since this practice was illegal under the 'Birds' Directive.
Today, trapping is allowed under derogation for only two species, song thrush and golden plover. Maltese trappers hope and fight to reinstate this time-honored tradition once again, under derogation, abiding by the rules and regulations of the EU.

Abstracts
Posters

Impacts Humans > Wildlife

P.HW.01

Brown bear of the European Russia in at the beginning of the XXI century

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KEYWORDS : area ; ecosystems ; number ; population

European population of brown bear shaped completely in early-mid Holocene (5,000 - 10,000 years ago). That time the species habitat area was the largest. For a long-term period it covered major part of Europe.
The evolution of the species always proceeded in adaptation to living in forest ecosystems, which are still the main and most productive habitats of brown bear.
Decrease of the brown bear area in the region started in the end of XVI century, accelerated by the end of XIX century and lasted until the end of 1960s. The southern limits of the area by that time moved to the north by hundreds of kilometers.
Currently brown bear inhabits 30 of 35 subjects of the Russian Federation (not considering the Caucasus). Population growth in the region started in the early 1970s and continued until mid 1990s. During the last 20 years bear population in Russia increased by 20,000 animals (nearly by 18%) with the main growth occurring in the European part and the Urals.
By the end of 1990s it started decreasing again due to economic difficulties and disorder in the use of natural resources during the transition to 'market economy' that was going on in Russia that time. It caused unprecedented growth of unemployment with maximum 13.2% of the active population in 1998.
It caused growth of so called 'socially stimulated' poaching in Russia which led to population decrease of many species including brown bear.
Resettlement of residents from small villages to larger settlements resulted in significant decrease of rural population. From 2002 to 2010 Russia was loosing about 2 small settlements every day. By now about 150,000 villages and small rural settlements have been depopulated.
During those years over 30 million ha of agricultural lands were abandoned and livestock number decreased more than 2 times.
However that process which was negative for the economy, contained rather positive factors for the brown bear. Abandoned arable lands, hayfields and pastures and far ends of the villages were fast overgrown with grass and bush and then with forest. All those factors resulted in the bear number growth at the turn of the Millennium.
At present both in the region and in Russia as a whole the predator population is growing. Population growth was accompanied by a well expressed species expansion to the south and inhabiting abandoned agricultural lands.
Total number of brown bear in Russia in 2010 was estimated by the state count service as 181,449 animals. Of them 54,400 (about %) were counted in European Russia, 50,890 (%) in the Far East and 65,000 (%) inSiberia.
Until 1983 bear was considered a harmful animal and bear shooting was financially encouraged. In 1984 the predator was reclassified as a valuable game species; and it was that time when bear poaching started growing up.
During recent years the legal bear hunting in the region varied within 1779 - 1867 animals. And the set quota has never been reached. Illegal hunting is presumably two or even three times higher.

P.HW.02

Lynx of the European Russia in XXI century : population, protection, use of resources

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KEYWORDS : area ; ecosystems ; number ; population

The author has been studying lynx geographic distribution and ecology in the region for 20 years. Between 1999 and 2003 the lynx population was growing; starting from 2003 it is decreasing. Count data is as follows : year 2000 - 8,840 animals; 2003 - 10,580; 2007- 8,240; 2010 - 7,260 animals (total in Russia - 20,260). Major lynx resources currently concentrate in the forested North-West (3,140) and Volga (2,970) regions.
Main reason for the number decrease is a prolonged depression of hare population. The other reason is poaching often resulting from unemployment and lack of subsistence finances. Legal lynx take data in the same years is as follows : 123; 143; 21; 109 animals. Illegal take might be 10 times as much! It should be stressed that lynx is registered in the Red Data books of five administrative units of the region.
Problems of the species wellbeing are related mostly to the anthropogenic impacts rather than to the natural factors. Impact of the climate warming and consequently, abnormal heat in Russia in summer 2010, on the predator is not clear. The issue is being studied.
Anthropogenic transformation of the ecosystems causes significant and ambiguous impact on lynx. Felling (often uncontrolled and uncivilized) impacts main lynx's habitats. However later the cleared space is overgrown; thus it acquires higher ecological capacity for hare and consequently for lynx.
Consequences of economic reforms of 1990-ies are of big importance. In 1991 - 2005 over 17,000 country settlements were abandoned; agricultural areas decreased. Nearly 30% of arable lands were abandoned in Russia. The abandoned areas due to the succession processes are overgrown by new forest ecosystems providing high-yield habitats for lynx and its prey - hare. This large-scale process is observed everywhere in the region, except for the taiga areas.
On the whole the lynx future in the region is doesn't cause optimism; however it no doubt requires further protection.

P.HW.03

Mallard Anas platyrhynchos in artificial nest sites in Latvia, 1999-2012

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KEYWORDS : harvesting ; nesting success ; philopatry

Due to decline of ground nesting duck breeding success caused by population growth of alien predator American mink we tested elevated artificial nests sites (ANS) with predator guards. Two types of ANS - hay cylinder and wooden corridor - were widely used by ourselves and recommended to hunters. The total number of ANS in Latvia has been estimated as no less than 1500-2000 in 2007 and several thousands in 2013. This report is based on about 2500 annual checks of ANS in order to establish occupancy, nesting success, and more detailed study in two sample areas in 2005-2012 where in total 4856 one-day old ducklings were ringed and about 80 incubating females trapped annually.

Slight difference was observed between occupancy of both types of ANS only in the first year when ducks preferred hay cylinders. No difference was observed later. Occupancy increased by years from ca. 10% in the first one to =100% in the 4th - 6th year (simultaneous incubation or consecutive clutches by two females in the same ANS). Better occupation of ANS has been observed on different ponds than on lakes rich in emergent vegetation.

In average, about 85% of Mallard clutches in ANS were successful, 8% - predated, 7% - abandoned for different reasons. ANS construction excludes predation by mammals and Marsh Harrier. Deviations from suggested construction and unexpected rise of water level explains predation by American mink (4%), corvids are responsible for 4% of predation. Only 7% of Mallard ground nests survived in pond areas with ANS.

Ringed females were trapped on nests in 286 cases. Pronounced breeding and natal philopatry is inherent to Mallards nesting in ANS. Adult females were found nesting in the same pond (97.2%) and same ANS (50.6%) as in previous year. Young females are found nesting in ANS in the native pond (96.3%) and even in native ANS (4.6%). Nesting of young females in native pond depends upon number of available free ANS, and ranges from 5 to 33%. Natal dispersal to ANS in other waterbodies 1-17 km apart was observed in 4 cases (3.7%) when free ANS were lacking or native pond was drained. Young birds may imprint not only location of native wetland but also the type of nest site - hide elevated above water and covered from above; although, if ANS are lacking, ANS born ducks can nest on ground (one case 5.7 km from birth place).

P.HW.04

Extension of the area of the Amur tiger in the Russian Far East, north

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KEYWORDS : Amur region ; people ; The Republic of Yakutia ; tiger

Aim of this work is describe incursions of Amur tiger in Republic of Yakutia and the Amur Region on the basis of actual data. Tiger strays into the territory of Yakutia known since the 16 century and till nowadays noted eight cases of actual registration of tigers and two were not conclusively established. A first record about tiger in Yakutia was in 1827. In 1833 and 1846 in Central Yakutia (in Hangalass and Amginsk regions) were hunted two more tigers.
After above-mentioned causes, a tiger appears on the territory of Yakutia only after more than 50 years - in 1905, at the same place, Ust-Maya region. Then tiger were noticed in Ust-Maya region in February, 1929.
In winter 1942, in Aldan basin near the border of Yakutia with Amur region were found frozen tiger without gunshot wound. According to information from hunters and reindeers of lengra village Neryungri region, in this area there were traces of tiger up to 1970-80's.
Sensational news about the discovery of traces of unknown beast were published in the local paper for the hunters 'Aar tayba' of 29 November 2012.
Reasons of tiger's entry so far beyond his range, in south-eastern part of Yakutia, in the band of middle larch forests are of particular interest. It's very hard to imagine continuance existence the Amur tigers in Yakutia.
Cold climate, high snow cover, paucity and poor group of potential victims of a tiger in southern Yakutia does not promote full existence. That why penetrated far to the north, because of hunger, he often went to the contact with people and became their victim, didn't find a usual prey. Tie predator penetration on north with global warming is impossible, because tiger's visits were both in the coldest period and in moderately warm years. In 1902, in Central Yakutia negative air temperature were down to -63C degrees.
If we assume that long-range movement of the Amur tiger in 19th century were due to high number and wide distribution of species in Far East, when these animals were noticed in Yakutia and Zabaikalie that reasons of long-distance movement of the Amur tiger in 20th century, in period of multi-reduction of the range and population size to 30-50 species are difficult to explain.
In Amur region occasions when human meet tiger during recent years have increased in Arharinsk region.
In 2003-2005's officers of Norsk conservancy area have observed for movements of Amur tigers. In a protected area tiger felt fine, but as soon as departed to north, in Romnensk region tiger was immediately killed.
One of the reasons why tiger came - a good food supply. Norsk conservancy area known Selemdjinsk population of migrating roe deer, which numbers up to 5000 animals. The average speed of tiger is 7 -7,5 km a day.
Thus, it's necessary to consider the hypothesis of the existence, and possibly the formation of new previously lost 'Eastern' transition to the Amur region and the Republic of Yakutia, which requires confirmation and further research.

P.HW.05

Factors influencing nesting success of ducks

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KEYWORDS : climate ; larids ; predators ; water level

Both natural and human caused factors influencing breeding success of ducks have been investigated in Latvia since 1958 mainly on two coastal lakes - Engure and Kanieris. Conclusions obtained during this study are based on information about more than 10 000 duck nests found in Engure and more than 2700 in Kanieris.
Complicate and in some aspects contradictory interactions between different direct and indirect, biotic and abiotic impacts are found to be responsible for nesting success of ducks. These impacts can be divided in two main groups - climate and humans.
The influence of climate has affected ecosystem of waterbodies by raised temperature and water level which changed both plants and animals, including invertebrates very important in ducks diet (disarranges synchronization between hatching of chicks and emerging of water insects).
Human impacts are quite diverse. Lowering of water level (Engure - 1842, Kanieris - 1902) and restoration of it (Kanieris - 1965) allowed to follow changes in habitats and waterfowl populations. Organic pollution and ceasing of grazing and mowing causes unfavourable vegetation succession - overgrowing of coastal/island meadows by shrub and reed, merging of small emergent islets into huge reed dominated aggregations. Introduction of two alien predators - American mink and Ussurian Raccoon dog - is destructive both direct (predation of clutches, killing of incubating females) and indirect (chasing away colonial larids which colonies are highly attractive for nesting ducks as they are quite effective in protecting of nests against local avian predators (Marsh Harrier, corvids, etc.). Colonies of Black-headed Gull which welfare is quite depending on economic activities of humans including availability of anthropogenic food (fish waste in canneries, existence of mink farms etc.) are the most favourable. There are no evidences that recent hunting pressure have significant negative influence on breeding populations of ducks in Latvia.
Most of human caused impacts are negative but also positive ones should be taken into consideration. Targeted activities such as providing undisturbed conditions during nesting season, regulation of water level, maintaining of suitable vegetation, control of alien predators, attracting of larids for breeding as well as setting up artificial nest sites supplied with anti-predator guards for some species (e.g. Mallard) are quite effective measures for successful and flourishing existence of breeding duck populations as have been shown on some Latvian waterbodies. For example, number of breeding ducks in Engure increased more than twice (from 1050 to 2600 pairs) during 1958-1992 due to purposeful management measures.

P.HW.06

Is game management an acceptable tool of nature conservation actions in protected areas?

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KEYWORDS : conservation ; game ; hunting ; management

Game management has been an accepted tool for nature conservation actions in protected areas at large. The focus has been on the control of overabundant species (i.e. ungulates) and invasive species (i.e. mink and raccoon dog). Recreational hunting in general, both as a part of game management and as a traditional form of recreation, is widely accepted and highly valued in most European countries. In the EU, the habitats and birds directives aim to protect the European flora and fauna, partly through the establishment of Natura 2000 areas. The creators of these directives stated clearly that these areas should be areas where humans and nature can coexist. However, some of the European countries have developed a stricter policy in banning different kinds of human activities, mainly as a result of changes in the social-cultural attitudes towards a strict protection of nature.
In Finland, game management, including hunting, is based on land ownership. In the 1990s, when the Natura 2000 sites were selected, the Government drew up a very liberal policy on hunting in these areas. However, when the nature conservation act (1096/1996) was revised in 2011, hunting became the most debated issue in the process. Currently, there is an ongoing process in Finland to establish approximately 780 000 ha of protected areas according to the revised nature conservation act. The starting point is that hunting, which is currently taking place on most of the soon to be-established-areas, will be largely banned in all state owned protected areas in Southern Finland. Derogations and exemptions are possible for invasive species such as raccoon dogs and minks, and individuals causing damage to forests or livestock, or cause a danger to humans. In the Northern parts of Finland the starting point is the opposite; hunting is allowed but there can be restrictions if necessary with reference to the conservation objectives. The interpretation of issuing the derogations is however not coherent within the country. The prohibition of inconsistency of game management in the country has resulted in a great mistrust and conflicts between managers of the protection areas and the local hunters.The presentation will discuss the background of the conflict and possible future challenges of game management in protected areas with such a strict hunting policy.

P.HW.07

Effect of the silvicultural method on the food supply of ruminants

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KEYWORDS : biomass ; common beech ; continuous forest cover method ; ungulates

In this study we conducted a comparative examination in order to determine whether old growth woodlots of beech (as preferred tree species) show any differences in biomass and composition of shrub and tree species compared to woodlots managed by individual selective cut, group selective cut and strip selective cut. For our examination we selected woodlot segments in old growth beech forests, where vegetation status reflected original nudum prior to any type of cutting, status where strip selection cutting was practiced, status where group selection and status where individual selection was done. Samples were taken from specified 3m wide strips while taking into consideration the various cutting techniques and size of the study sites. In each sample strip we counted and identified every stem of woody vegetation suitable as a food source for ruminants. We considered all shoots suitable as food source located up to 2.2m from ground level and located on branches above the last split. Based on the field and laboratory data we determined the biomass of each sampled tree species as well as a total value, which we then further extrapolated for the entire woodlot community and quantified it in kg/ha. In the old growth woodlots and in woodlots managed by strip selective cutting the biomass was largely represented by beech; whereas the presence of other plant species was insignificant. In woodlots managed by group selective cutting or individual selective cutting biomass of wild blackberry was the greatest; closely followed by beech in individual selective cut woodlots. In terms of identified species, biomass of the Sycamore Maple was most significant in group and individual selective cut woodlots. In terms of total available biomass for feeding of wild game the lowest value was measured in unmanaged old growth beech forests. In forests managed by strip selective cutting and group selective cutting the measured biomasses were greater, twice as high, compared to old growth actually unmanaged state woodlots; whereas, in the case of individual selective cut woodlots the measured value was over ten times greater than that of the old growth state value. In terms of biomass of identified plant species, each species showed significant ($p=0.01$) differences between measurements of the unmanaged old growth state woodlots and all other managed forests. It is important to expand this study in the future and examine all cutting management techniques further in order to scientifically validate their impact and effectiveness as well as to have reliable data for comparative examination of various management practices. Based on our current understanding it appears that biomass available to ruminants for consumption shows a rapid increase at the early stages, which is first followed by an increase in plant species diversity (number of species), then followed by an increase of biomass per each newly appeared plant species.

P.HW.08

Wild boar at the northern limit of the species range : extreme conditions, high abundance

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KEYWORDS : abundance model ; anthropogenic food ; stomach analysis ; supplementary feeding

The abundance of wild boar increased markedly throughout Europe during the second half of the 20th century. In some areas, this may reflect an increasing role of agriculture - crops can represent a more abundant food source than natural mast foods. However, on the northern border of the species range, crop availability is seasonally limited and natural mast food is practically absent and cannot account for the maintenance of boar populations through the long winter (approximately 8 months). It has been suggested that supplementary feeding might contribute to local variation in wild boar population density and that food availability is the most important factor determining the northern border of the wild boar range.
The wild boar population in Estonia currently contains over 22 000 animals according to hunter estimates. With 0.5 wild boar per km^2, the density is higher than those recorded from similar latitudes in Russia. The number of supplementary feeding sites in Estonia has also increased together with the abundance of wild boar - the number of feeding sites doubled in the 2000-s compared to the 1990-s. Although the majority of feeding is carried out during winter to decrease mortality during the coldest months, some supplementary feeding also occurs in summer, with the intention of keeping animals within the borders of particular hunting districts.
We studied the role of supplementary feeding on wild boar density at the northern border of the species range using stomach analysis, winter census data and a mixed effects modelling approach. The results revealed that the number of supplementary feeding sites is one of the most important factors determining the high densities of wild boar in Estonia and can even outweigh the detrimental effects of harsh winters. The current importance of supplementary feeding is further supported by the relatively high amount of anthropogenic food in wild boar diet during spring - frequency of occurrence was 60% and percentage volume 40% in spring 2012. This is notable as it demonstrates the dependence of wild boar on supplementary feeding during a period when natural food is present, but crops are not yet ripe.
This study emphasizes the importance of food in determining the density of wild boar and offers empirical proof for the hypothesis that boar are not limited by harsh winter conditions if the availability of food is sufficient. It can be concluded that the density of wild boar at the northern edge of the species range depends largely on management rather than the availability of natural mast food or climate.

P.HW.09

The private sector rescues wildlife in West Africa

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KEYWORDS : Burkina Faso ; private sector ; wildlife increase ; wildlife management

The authorities in charge of wildlife in Burkina Faso were aware to find the resources to conserve biodiversity on protected areas that represents 15% of the national territory. In this context Konkombouri Hunting Area (KHA) part of the W-Arly-Pendjari Ecosystem was rented to a private concessionaire since 1996. KHA (650 km$^{2)}$ was empty of roads, and water-points at that time. The single water point was located along the Singou River in south of the KHA. Since 1996 the concessionaire created more than 400 km of roads and 13 artificial water-points. Anti-poaching patrol became permanent with the collaboration of Wildlife authorities. This had for consequence that mammal density increased tree folds in 9 years from 7 to 25 animals/km^2. The biomass increased from 1000 kg/km^2 in 1992 to 5000 kg/km^2 in 2006-07. The main activity led in KHA is big game hunting of buffalo Syncerus caffer, lion Panthera leo and antelopes. In 12 years, KHA contributed to 1,18 million Euro (151 Euro per km^2 and per year) to the local and national economy from which 37% for the state, 44% for local and foreign service providers, and 19% for local communities. The concessionaire faced difficulties both in terms of the relative short duration of concessions and the poor access to credits. These phenomena limited the level of investments in the area. Despite these difficulties, the KHA's concessionaire, proved that if a protected area is managed appropriately, wildlife can recover and creates significant input to the local and national economy.

P.HW.10

Restoration of tree nesting population of European Peregrine - methods and population model

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KEYWORDS : ecotype ; imprinting ; modeling ; restoration

The tree-nesting population of Peregrine Falcon Falco peregrinus peregrinus inhabited a large part of Central and Eastern Europe. It's range covered northern-eastern Germany, eastern Denmark, Poland, southern Sweden and Finland, Baltic States, Belarus, northern Ukraine, lowlands of Russia up to the Ural Mountains. In 1950s Peregrine Falcon populations drastically decreased on the whole worldwide range, as a result of environmental contamination (mainly by so called Persistent Organic Pollutants, including DDT). Some populations went extinct, including whole tree-nesting European population. The last nest in Poland was found in 1964.
Falconers started to breed Peregrines and developed methods for intensive breeding and reintroduction. With the ban on DDT in most countries, the situation of the Peregrine began to improve, populations that survived the crisis began to rebuild. Reintroduction significantly accelerated restoration process in many places, some populations were restored from zero. Unfortunately, the tree-nesting population did not began to regenerate naturally, the only way to restore it is reintroduction.
In Poland falconers started first attempts to breed Peregrines at the end of 1970s, with first results in mid 1980s. Reintroductions in Poland started in 1990 and were conducted mainly in forest areas, some in mountains (Pieniny) and cities (Warszawa, Kraków). Since 2010 the whole restitution program is conducted by Society for Wild Animals Falcon. In 2010-2012 a total of 197 young Peregrines were released. In 2010 the satellite tracking project was started and the DNA sample project is continued. On the website of the Society since 2003 there are webcam translations from wild nests of Peregrine, gaining increasing interest. The webcam in 2003 was probably the first one showing a wild nature in Poland.
The tree-nesting project was successfully conducted also in eastern part of Germany. The project was conducted in cooperation with DFO, German Falconers Orden. Both projects are based on idea of imprinting on place of birth. That proved to be successful. In Germany there are more than 20 pairs breeding on trees now. In Poland the first chicks from nest on tree were ringed in 2012.
Poland is a key country for success of the tree-nesting Peregrine recovery in Europe. Currently the work on this ecotype is conducted also in Germany, projects are planned in Lithuania, Belarus and Russia. The necessity to conduct the tree-nesting recovery project was included by IUCN/Birdlife International into the Species fact sheet, as Peregrine on global level has a Least Concern status, except the tree-nesting population which requires further active conservation actions.
Mathematical modelling of the large bird raptors is very difficult, but gives the possibility to optimize the conservation strategies and eventual sustainable use level.

P.HW.11

Habitat changes and dynamics of brown hare populations in western Po Plain (northern Italy)

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KEYWORDS : demography ; density trend ; Lepus europaeus ; urbanization

The decline of brown hare populations recorded in European Countries since the half of the past Century has been observed also in Italy where the main causes are identified in agricultural intensification and changes and overhunting. Other supposed factors of the decline included habitat losses due to the increasing urbanized areas and road networks, and predation impact. From autumn 2005 to autumn 2012 we monitored nine hare populations living in protected areas of the Province of Milan (northwestern Italy) which is characterized by a very high urban density and where arable land is dramatically decreasing because of the expanding urbanization. The aims of this research were : i) to define population trend, ii) to evaluate the effect of habitat losses on hare populations, and iii) to find the main demographic parameters affecting hare population dynamics. We carried out nocturnal counts in March and November of each year and we estimated the densities by Distance Sampling method; using pre and post-breeding densities we estimated the spring to autumn increases and winter losses. For each protected area we measured the percentage of land use classes at the beginning and at the end of the study from two different editions of land use digital map of Lombardy Region (DUSAF, Regione Lombardia). We carried out curve-fit analyses on spring and autumn densities over the time in order to assess population trend and correlation and regression analyses between the percentage change of densities and spring to autumn increases, winter losses, and changes of habitat variables to individuate the main factor affecting population decline. Total spring density was 18.1 (SE=8.43) hares per km^2 in 2006 and 17.8 (SE=6.91) in 2012; the difference between the initial and final densities was not significant (t=0.03; P=0.976). No significant trend resulted for spring density (R2=0.001; F=0.003; P=0.956) but we recorded marked fluctuations in the study period (min=11.0; max=24.1). Total autumn density was 33.3 (SE=4.24) hares per km^2 in 2005 and 14.6 (SE=6.52) in 2012; the difference was significant (t=2.40; P=0.016). We recorded a significant and decreasing trend in the study period (R2=0.739; F=7.07; P=0.035). Only three out of nine hare populations showed increasing or stable trends and generally the decline of post-breeding populations was more marked than that of the pre-breeding ones. Declining populations were characterized by anomalous dynamics with negative spring to autumn increases and increases from autumn to the next spring. Percent change of post-breeding populations was negatively related to the percent change of urbanized areas (R2=0.921; F=25.10; P=0.002). It seems that hare populations in northwestern Po Plain are mainly affected by a very low recruitment probably due to habitat losses, increasing urbanization and related disturbance.

P.HW.12

Influence of hunting on duikers at the northern periphery of the Dja Reserve, Cameroon

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KEYWORDS : duikers ; hunting ; off-takes ; sustainable hunting management plan

Uncontrolled hunting by poor rural people constitutes a serious threat to wildlife populations. Given this persistent threat, Projet Grands Singes (PGS) attempts to implement a sustainable hunting management plan for effective conservation of animal species. The impact of village hunting on duikers (Cephalophus spp.) was assessed in a non-protected area of the northern periphery of the Dja Reserve, Cameroon. Surveys using standard line-transect methodology were conducted in three zones of the hunting area, each with an agreed hunting quota assigned to it, to determine vegetation types, levels of human activity and the abundance of duikers. Hunting effort was monitored to determine the number of snares set in the hunting area and each hunting zone. Age structure and total off-takes were determined by collecting data on duikers killed by hunters. The maximum and minimum sustainable rates of off-take were estimated using the FEER's logistic model. The hunting area was composed of primary forest (45 %), secondary forest (37 %), swamp (13 %), riparian forest (3 %) and fallow (2 %). Hunting, agriculture and collection of non-timber forest products were the major activities carried out by local people within the hunting area. Snare density was 34 traps / km². Human activities and hunting pressure were low in the less-accessible (forest) zone. Abundance of duikers was low in the most-disturbed (village) zone and higher in the less-disturbed (forest) zone. Young duikers constituted the majority of the catch (53 %) in the most-disturbed zone, and adults the majority (55 %) in the less-disturbed zone. Off-takes of Cephalophus callipygus, C. dorsalis and C. silvicultor were 1.18, 2.58 and 1.66 times higher than the maximum sustainable off-take, respectively. Off-takes of C. monticola and C. nigrifrons were below the maximum sustainable off-take. Globally, off-takes were 1.07 times higher than the maximum sustainable off-take. The results show that uncontrolled hunting pressure leads to over-exploitation of C. callipygus, C. dorsalis and C. Silvicultor, and that duikers are threatened by hunting activity; the abundance and stability of their populations tend to decrease with proximity to human activities and increase in snare density. These results highlight the persistent threat on endangered species, and have relevance for all stakeholders in wildlife management, for the implementation of sustainable management and utilisation of wildlife.

P.HW.13

Assessing suitable habitat for lynx (Lynx lynx) along the German-Czech border

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KEYWORDS : habitat modeling ; Lynx lynx ; Maxent ; radio-tracking

After reintroduction, the population of Eurasian lynx Lynx lynx in the Bohemian Forest Ecosystem apparently grew in size and distribution. However, according to lynx occurrence data, the growth stagnated after a couple of years and the population even decreased. This stagnation might be caused by various reasons. With our study, we aimed to assess availability of suitable habitat along the German-Czech border, under the assumption that the population of lynx does not realize its entire potential distribution. On the basis of GPS data of ten radio-collared lynx, we modeled suitable habitat with a maximum entropy approach. Thereby, environmental variables were defined by means of CORINE land cover. Furthermore, we assessed model performance at different grain sizes which turned out to be best at 1 km^2. The model's extrapolation was restricted to a predictable range by application of principal component analysis. We found variables related to anthropogenic influence, like human settlements or acre, to contribute to the model at most. These variables were negatively associated with lynx occurrence. The model prediction was evaluated with lynx indications collected in Bavaria and suggests that there is more habitat available than currently occupied. In a final step, we estimated the expanse of potential habitat under consideration of the mean annual home ranges which were 432 km^2 for males and 122 km^2 for females. According to our results, along the German-Czech border, there is enough suitable habitat available for a population of 80-100 lynx.

P.HW.14

Not less than 2000 hectares ! An integrated approach to wildlife management in Walloon farmlands

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KEYWORDS : game management ; landscape-level ; participatory approach

Different land-use systems can have a key role in landscape-level wildlife management and conservation. Sustainable land use widely depends on the human dimension of management. However, an appropriate geographical level needs to be set in order to accommodate different biological, economic and social interests.
In Walloon farmlands, hunting estates are often small entities (240 ha in average) which are not suitable for integrated management. Our project 'Not less than 2000 hectares!', located in Wallonia (southern Belgium), aimed at developing a model of biologically sound management of wildlife, at large scale (with a minimum of 2000 ha). Such a scale involved a multi-actor approach (local authorities, farmers, hunters, foresters, conservationists…) with the goal of enhancing habitat for both game and non-game wildlife species. In this context, hunters, through their management activities, can be particularly good drivers for biodiversity promotion.
Four study sites, representing four different game management councils, were chosen, where an inventory of the existing ecological network was performed. All network elements were exhaustively censed and mapped (trees, hedges, agri-environmental schemes, etc.). Based on this inventory, target zones were identified for action and awareness raising. Different tools (private and public incentives, information and training sessions) were used in order to promote or to maintain a diversity of habitats, creating synergies between agriculture, hunting and other conservation interests. Yearly monitoring of game species represents follow-up indicators. The chosen scale gives a holistic view allowing better decisions to protect, restore, and manage game populations.
In conclusion large territories (2000 hectares minimum) are consistent management units for farmlands game in Wallonia. At a biologically sound territorial level, the participatory approach can be a powerful tool guiding local use of land and wild living resources.

P.HW.15

Integrating people and wildlife for sustainable management

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KEYWORDS : game management ; public participation ; stakeholders' involvement

Wildlife management conventionally involves three interdependent dimensions : wildlife, habitats and humans. Indeed, most concerns related to wildlife populations and habitats usually have direct or indirect human dimension considerations.
In Wallonia (southern Belgium), actors of game and wildlife management include territorial authorities, scientific and technical experts as well as local stakeholders (farmers, hunters, local authorities, foresters, conservationists…). In order to reconcile interests, wildlife management needs to achieve benefits at individual, group and societal levels.
Since 2008, we have been carrying out several projects aiming at developing a model of biologically sound management of wildlife, at large scale (with a minimum of 2000 ha). At the landscape level, interactions occur among people, and between people, wildlife and habitats. Considering the pervasive effects of humans on wildlife management, a key step in our projects involves a multi-actor participatory approach aiming at enhancing habitat for both game and non-game wildlife species.
In this approach, identifying the drivers of stakeholders' engagement and their relationship to wildlife is an essential element. How do people value wildlife? How do they want it to be managed? How do they affect or are affected by wildlife and wildlife management? The attributes of the social system needs to be taken into consideration while designing the biological system management.
We conclude that insights from the human dimension should systematically inform and guide management decisions and actions. The active participation of local stakeholders in the decision-making and management process represents an essential support to policy, incentives, and legislation that can be used to promote wildlife management in Wallonia.

P.HW.16

Dynamics and perspectives of the hunting world. A study in the Rieti province (Italy)

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KEYWORDS : conservation ; extinction ; exuberant ; hunters

The predominant opinion converges on a substantial aversion from modern society against hunting. Hunting is perceived as an exercise aimed solely at the taking of wild animals, action less and less accepted in a hystorical period like the present one in which environmental awareness and animal rights spread and became widely entrenched. It is widely recognized that some of the current ecological imbalances were also generated from the senseless hunting management, like the introduction of exotic species and breeds (i.e. : *Sus scrofa* - central Europe races), the non sustainable taking of native species (i.e.: *Lepus europaeus* and *Lepus corsicanus*). The artificial transformations of the variety and availability of food resources favoured the demographic explosion of some species (i.e. : *Corvidae* and *Vulpes vulpes*) usually penalizing other species, some of them of particular interest for conservation (i.e. : *Alectoris graeca*). The main causes for the recovery of some species, now considered to have high biological value but reduced to extinction in the past due to the intense persecution to which they were subjected as damaging animals (i.e. : *Canis lupus*), have been identified in the imbalances described above (i.e. : current abundance of the Wild Boar). Today, in the arduous attempt to contain the species that have become exuberant (i.e. : Wild Boar, Hooded Crow, Fox etc.) at the expense of those of conservation interest, we rely more and more frequently in the active collaboration of the hunters. A louder and louder demand for numerical control of the Wolf is present as well in areas where the species has reached density levels considered unthinkable only a few decades ago, and where the damages to livestock are gradually becoming unsustainable. Moreover, in many national protected areas, until a few years ago considered categorically exempt from any form of 'hunting', there are now plans in place for selective control of exuberant (i.e. : Wild Boar) and/or exotic (i.e. : *Myocastor coypus*) species, in most cases carried out with the indispensable help of hunters, even if properly trained. Hunters are fundamental as well to implement projects containing species impacting on forest cover (i.e. : Roe Deer, although only in certain areas as a selective control). According to the current dynamics of wildlife, the presence of a well-organized, cooperating with civil society, hunting world is an objectively indispensable system. At the same time, however, the hunting world shows a progressive aging and a steady decline of practitioners. Assuming a constant trend now in place, the available data for the province of Rieti clearly indicate that the hunting world is destined to be extinct in 30-40 years. What will happen then? If the ecological conditions will stay identical to the present ones, how can we counter the widespread and large abundance of certain species impacting on forest cover, communities, wildlife and human activities? Beyond any preconceived position, it is important to pay particular attention to this phenomenon, in order to assess the possible effects and to be able to adequately prevent the negative ones, perhaps by acting on the regulatory, cultural and educational framework.

P.HW.17

Similarities and differences in Red Deer and Roe Deer poaching. Rieti (Italy)

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KEYWORDS : Gran Sasso-Laga ; hunting ; Riserva Naturale Regionale Montagne della Duchessa

The survey was conducted in two areas of the province of Rieti where roe deer (Capreolus capreolus) and red deer (Cervus elaphus) are sympatric, and wild boar hunting is practiced with a stalking technique. In the province of Rieti, wild boar hunting is carried out in areas permanently assigned to teams of hunters licensed in the competent offices. Roe deer and red deer colonized the province in early 1990s. The roe deer, spreading to the area from Umbria and Abruzzo due to natural colonisation , has gradually settled down in the whole province following a Northwest-Southeast direction. The red deer, however, spread into two separated and not particularly extensive areas, largely identified with the Parco Nazionale Gran Sasso Monti della Laga, the Riserva Naturale Regionale Montagne della Duchessa and a large buffer of areas adjacent to them. In these areas, the species is in sympatry with the roe deer and shows a clear tendency to expand.

The sponge effect that protected areas have on the wild boar makes the adjacent territories particularly frequented by the suida, and much sought by hunters. Consequently, these territories became natural hunting areas. This has created the conditions for hunters to encounter deer during wild boar hunting. Italian national legislation includes red deer and roe deer among the non-huntable species. Consequently, even if intercepted during the hunt for other species, they cannot be taken. Cases of killing, then, are a real crime of poaching, very serious since wild animals are classified as 'unavailable property of the State'.

Yet, despite the severity of potential penalties, cases of killing are not rare in oart because of inadequate policing. This survey, conducted on a confidential basis with members of 25 teams of hunters (about 20% of the total licensed teams from the provincial offices), revealed a substantial difference on the motivation for hunters to commit such a crime. The roe deer is almost actively hunted because commonly considered a disturbing factor for dogs trained to find and hunt wild boars, distracting the dogs from seeking boar. Poaching of red deers poaching has different causes. Less abundant than roe deer, red deer are killed primarily for trophies and for venison. The lower frequency of their illegal killing, given the significant size of the red deer, is also related to the higher difficulty of transporting carcasses without being observed.

P.HW.18

Hunting disturbance on waterfowl : scientific truth or illusion?

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KEYWORDS : population dynamics ; recreational disturbance ; time frame

The concept of 'disturbance' is a current topic in discussions about hunting in nature reserves and government domains in Flanders. It is often stated that hunting is not desirable as it would disturb waterfowl present in these areas. Many studies refer to the change in waterfowl behavior (eg. Madsen 2001; Boos 2002; Zimmer et al. 2010; Zimmer et al. 2011) and waterfowl dispersal (eg. Madsen & Fox 1995; Madsen 1998 but see Kleijn et al. 2009; Dooley et al. 2010) in response to human disturbance (including hunting). However the one question relevant for nature conservation and biodiversity policy is if hunting disturbance affects the population dynamics of waterfowl by affecting reproduction and survival (Gill et al. 2001). On the basis of a literature study it was investigated which effects disturbance has on waterfowl populations and - in particular - on waterfowl population dynamics. Hunting disturbance was compared to other types of disturbance providing a framework useful to evaluate disturbance effects on waterfowl in a broader context.

From the literature study it was shown that the effects on the population dynamics via the effects on reproduction, reproductive output and survival should be nuanced. These effects appear to be critically dependent on the time frame and the local environmental situation. It was shown that disturbance occurring in the period of the migration to the nesting areas had a negative effect on the reproduction and the survival of the juveniles for arctic geese (Mainguy et al. 2002; Bêty et al. 2003; Drent et al. 2007). Also disturbance during the reproduction period had negative effects on reproduction and survival (Liley & Sutherland 2007; Krijgsveld et al. 2008; Le Corre 2009).

In other periods of the year disturbance effects are barely documented (Madsen & Fox 1995; Krijgsveld et al. 2008; Le Corre 2009), however it seems to be dependent on the environmental conditions. Food limitation (Goss-Custard et al. 2006) and hence the quantity and quality of winter habitat (Cayford 1993) is herein the key constraint; waterfowl being more sensitive to disturbance in case of food limitation eg. during cold spells (Goss-Custard et al. 2006). An experimental study about the effects of disturbance during winter period showed no effects on the reproductive success (Zimmer 2010).

While for disturbance during the hunting period (autumn - early winter) only negative effects on population dynamics have been reported in case of food limitation or (exceptionally) intensive disturbance, effects of disturbance during spring migration and reproduction period are clearly more detrimental. In these periods and during cold spells, regular hunting is not allowed but recreational activities are and can negatively affect waterfowl population dynamics (eg. Krüger 2002; Taylor et al. 2005; Murison et al. 2007). The categorical statement that hunting disturbance is subverting waterfowl populations seems to be more of a perception than scientific truth.

P.HW.19

Effect of legislature on game management in Poland

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KEYWORDS : big game ; hunting clubs ; non-professional management ; wildlife damages

In Poland, game animals are not the property of landowners, but the national property. Poland's national territory is 312 thousand km^2, of which 80% is divided into 4,800 hunting districts. Game management is carried out by 2,500 hunting clubs which are legally obliged to be members of the Polish Hunting Association (PHA). The PHA is a non-governmental organisation with membership of 120 thousand hunters of various professions. Forests cover nearly 30% of the national territory, these are chiefly state forests. The supervision of forest management is exercised by the State Forest Service through 425 forest districts.
The statute of 2005 has transferred the responsibility for game management to the Polish Hunting Association, which also drafted criteria for planning the harvest quotas for big game as well as the principles of small game management. In theory, supervision of game management should be exercised by the State Forest Service employing over 6 thousand people having expert professional knowledge of game animals. In practice, however, the population numbers and harvest quotas of game animals are decided by hunting clubs. The lack of effective supervision of the activities of hunting clubs has resulted in the densities of big game animals exceeding 2-3 times the levels set by the Ministry of Environment. At present, the maximum densities of red deer and wild boars range from 100 - 150 individuals/ 1,000 ha of forest, and the population density of roe deer is double the figure given in hunting statistics (200 thousand animals) and is continuously increasing. Meanwhile, in the farmlands, there has been a dramatic drop in the number of small game. The annual harvesting of hares now amounts to 30 thousand individuals and that of partridges - 3 thousand.
Inadequate game management has resulted in the high level of damage inflicted by big game in cultivated fields (costing €15 million/year), which - despite the compensation paid by hunting clubs to farmers has caused hunters to be isolated among local communities. Taxpayers money is spent on fencing young forest plantations (€40 million/year), whereas the increased pressure from cervids on unfenced portions of forest has resulted in the biological diversity of forest vegetation cover being reduced. For this reason, the present statute should be urgently amended. The effective supervision of the State Forest Service over the activities of hunting clubs should be restored, the population densities of red deer, roe deer, and wild boar should be reduced, the small game population restored, and new criteria should be drafted aimed at achieving sustainable game management in Poland.

P.HW.20

Habitat improvement actions and pheasant and red-legged partridge land uses

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KEYWORDS : Alectoris rufa ; feeders ; hedgerows ; Phasianus colchicus

Introduction
Red-legged partridge (Alectoris rufa) and Pheasant (Phasianus colchicus) have suffered population declines in the last decades. Several researches have suggested that the decline is related to the habitat alterations in agricultural ecosystems caused by intensification of agricultural techniques and land abandonment. For this reason We evaluated habitat use and distribution of red-legged partridges pairs and cock pheasants in an estate that can be representative of most of the agricultural Mediterranean areas.

Material and methods
The study area was located in South-western Tuscany (Italy). Birds habitat use was observed from 2007 to 2012 with particular attention to the effect of artificial Habitat Improvement Actions (HIAs) and other management options such as supplemental feeding and hedgerows maintenance. Relative habitat use and spatial distribution (comparing points with birds and random ones) were calculated for pheasant cocks and partridge pairs.

Results
HIAs were used more then their availability by both species and resulted to have an important role in their distribution as well as hedgerows. Feeders resulted to have a strong effect on pheasant distribution, but not on partridges pairs. Partridge pairs significantly avoided woods and fallow fields but were significantly closer to hedgerows, HIAs, and fallow fields then random points. Pheasant cocks were significantly closer to HIAs, hedgerows, feeders, fallow fields, and woodland edges then random points. Logistic regression analysis between partridge pairs observation and random points showed a negative effect of distances from HIAs, hedgerows, vineyards, and fallow fields and a positive effect of distances from woods, arable crops, and olive tree groves whereas for pheasants we registered a negative effect of distances from HIAs, hedgerows, feeders, woods, and fallow fields and a positive effect of distances from arable crops.

Discussion and Conclusions
Our results confirmed that habitat management could be a fundamental tool for game-birds conservation and give important comparative evaluation of the different land uses. However the effectiveness of the employment of artificial feeders need to be better clarified for red-legged partridges.

P.HW.21

Genetic diversity of the Barbary partridge in North-eastern Sardinia

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KEYWORDS : Alectoris barbara ; heterozygosity ; inbreeding ; restocking

The Barbary partridge populations of Sardinia belong to the oldest and the most phylogenetically divergent species of the genus Alectoris, A. barbara. Nowadays, the species survives in few geographic areas outside the African regions : theSardinianIsland, Gibraltar peninsula andCanary Islands. Partridges are a good example of game fauna largely managed by humans and intentionally introduced in many Mediterranean islands. Probably, Sardinian populations of Barbary partridge are the result of human mediated introduction occurred about 3000 years ago. During the past decades breeding stocks were reared for hunting purpose in Sardinia and some breeding farms for population restocking arose in the island. Inbreeding and genetic changes in captivity can lead to low fitness, so the release of captive animals can affect the breeding performances of wild populations. Since 2000s Sardinian partridges declined throughout the entire island mostly due to over-hunting and habitat degradation; nevertheless the possible presence of inbreeding needs to be investigated. Aim of the study was to assess the level of genetic variation and population structure in Sardinian Barbary partridges. DNA was isolated from tissue samples of 120 Sardinian partridges. Fifteen partridges belonged to a breeding centre located in the north of the island, while 105 partridges were captured in 34 study areas located within theProvince ofOlbia-Tempio (North Sardinia) from September 2011 to August 2012. Samples were tested using nine known polymorphic microsatellites : MCW043, MCW104, MCW146, MCW199, MCW215, Aru 1E66, Aru 1G49, Aru 1J76 and Aru 1.29. Primers for each locus were labelled at5' with fluorescent dyes (FAM; HEX; ATTO550) and two multiplex PCR reactions were optimized. Moreover, we analyzed a 234 bp fragment of the variable domain I of the mitochondrial DNA. Sequences and fragment analyses were run on a 3130 Genetic Analyzer with ROX 500 standard for microsatellites sizing. Number of alleles per locus, allelic frequencies, observed and expected heterozygosity and inbreeding coefficient have been calculated. Preliminary results show a low number of alleles per locus and a low level of genetic variation in Sardinian partridges. Therefore constant monitoring and conservation plans should be implemented in order to maintain this particular population.

P.HW.22

Demography and habitat requirements of Barbary partridge in Northern Sardinia

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KEYWORDS : Alectoris barbara ; breeding success ; density ; MaxEnt

The Barbary partridge is widespread across North Africa, where it occurs from the coastal plains to the Atlas Mountains and edges of the Sahara. In Europe the species is present on Gibraltar, where has spread to adjacent Spanish mainland, in Canary Islands and in Sardinia Island. In Sardinia the species is widespread but since 2000s it has declined throughout the entire island mostly due to over-hunting, habitat degradation, in particular the removal of Mediterranean bush to improve livestock and agriculture. At present both biology and ecology of Barbary partridge is still poorly known, therefore the aims of our study were to assess demographic parameters, to model habitat suitability, and to individuate which habitat variables could affect population persistence. We studied the partridges in 34 study areas located within the Province of Olbia-Tempio (North Sardinia) from September 2011 to August 2012. We monitored partridges by pre and post-breeding censuses : winter coveys in November-December 2011 by the mapping method, pairs in April-May 2012 by the calling-count method from random points, and broods in July-August 2012 by the mapping method with hunting dogs. A tape-recorded call was used in spring to increase pair detectability. We mapped the location of each observation on 1:10,000 aerial photographs and recorded the number of detected birds, the distance of calling pairs, the number and the age class of chicks. We estimated the following main demographic parameters: average covey size, pair density by the Distance sampling, brood production rate (BPR), brood density, average brood size and chick survival rate. All parameters were estimated in each study area with the exception of average brood size and chick survival rate. Habitat suitability for partridges was investigated by the Maximum Entropy modeling (MaxEnt) performed on pair and brood observations, using Regional land use map and Digital Elevation Model. Pair and brood density averaged 22.9 pairs/km^2 (S.E.= 3.96) and 2.5 broods/km^2 (SE = 0.68). Mean BPR and brood size were 20.9% (SE = 11.1) and 6.7 (± 0.63), respectively, while chick mortality was 9.1%. The Maxent model showed that suitable areas for Barbary partridges should be characterized by low percentages of fallow fields, urban areas, rocks without vegetation and water with bushes, and by great percentages of Mediterranean scrubland and pastures. The North exposure reduced habitat suitability for the species. The Province of Olbia-Tempio was mostly unsuitable for partridges (67%), while the low-medium and high suitable classes accounted for 23.5% and 9.5% of the whole territory. Population dynamics of partridges inhabiting the northern province of Sardinia seemed characterized by low production rate which could lead to low brood production and juvenile recruitment. The low habitat suitability for breeding partridges, poaching and unsuited managed actions could cause the low population productivity by reducing suitable habitats for nesting, disturbing and killing breeding adults, increasing nest predation and clutch mortality during the first two weeks.

P.HW.23

Differentiation of roe deer density in forests depending on the structure of the landscape

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KEYWORDS : Capreolus capreolus ; inventory ; landscape ; roe deer

The driving sense method was used in the winter 2012 for the large-scale inventory of roe deer (*Capreolus capreolus* L.) in forests in the North-Western part of Poland on the territory of Regional Directory of State Forest in Szczecin. For the all forest complexes over 50 ha about 400 experimental plots (60-120 ha) were drawn with the area over 30 thousands hectares inclusively. During inventory the differentiation of roe deer abundance depending on type of landscape was observed. The density of roe deer in large forest complexes with dominance of Scots Pine forest was the lowest in the opposite to the agricultural landscape with dispersed forests with long line of ecotones, were the density of this species was the highest. The particular results of the inventory are included in this presentation.

P.HW.24

The role of food availability, human conflict and landscape features in wolf occupancy process

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KEYWORDS : Canis lupus ; environmental variables ; livestock damage ; wolf pack occupancy

Despite the recent positive trend of wolves, their conservation is still one of the most important priority in several European countries. The knowledge of mechanisms regulating population dynamics, territory occupancy, interactions with prey and human conflict is a prerequisite of a proper wolf management both on regional and national spatial scale. During the last two decades, Apennine wolf population has played an important role in the recolonization process both on national and European scale. Italian wolf population was threatened reaching the lowest historical number in the recent past. One hundred wolves survived in few isolated areas of the South-Central Apennines between 1960's and 1970's. Afterwards, this population started to increase and expanded northwards. Wolf occupancy process was not continuous in the same extent in each part of the Italian range; recolonization of Tuscan-Emilia-Romagna Apennine by wolves occurred in less than ten years and since 1990's this area is widespread inhabited by many wolf packs. The same phenomenon has been observed on Western Alps little time later. Wolves crossed the Ligurian Apennine and recolonized the South-Western Alps at the beginning of 1990's. Wolf presence rose quickly and the Western Alps were newly colonized by many wolf packs in few years. On the contrary, wolf occupancy process was slow in Liguria region. Although, since 1987 the first wolf pack was confirmed in the eastern Ligurian Apennine, no wolf pack has been observed in the remaining regional territory till 1997. Moreover wolf presence in Ligurian Apennine is still extremely low despite the presence of available land, with only 6 packs recorded on the whole region (5343 km^2). Thus, Liguria region represents a good opportunity to study wolf occurrence and persistence in relation to human and environmental variables as: landscape features, size and distribution of protected areas, prey availability and interactions with human activities. This research was carried out from 2007 to 2012. The wolf predictive model, computed with Theoretic Information Approach and model selection, confirmed a high level of habitat suitability of the whole Liguria region (60.4%). Moreover Liguria region has a rich and abundant ungulate community composed by wild boar (annual harvest : n=15275), roe deer (regional population size : n=16116), chamois (regional population size : n=880), fallow deer (regional population size: n=630) and free-grazing livestock (regional population size : sheep and goats=17301; cattle =1576). These data could produce a positive effect on wolf presence. On the other side, the low percentage of regional surface covered by protected areas (4.7%) and the high consumption of livestock (44.9%vm) revealed by wolf scats analysis could negatively influence the wolf presence. The high wolf-livestock conflict was also confirmed by many attacks and losses recorded (n. of attacks=196; n. of losses= 406), and by several wolves found dead during the study period (n = 12). Our results suggest that the distribution and size of protected areas and the high level of wolf-human conflict can play a key role in the occurrence and persistence of this species throughout the Liguria region.

P.HW.25

The structure of farmlands and the occurrence of field roe deer population in Poland

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KEYWORDS : density ; habitat preferences ; home range ; radio telemetry

The agricultural landscape in Poland is undergoing profound transformations as a result of the intensification of agricultural production. Roe deer is one of just a few species which has managed to adapt to dwell in the territories changed due to agricultural development in the 20th century. The project, carried out in 2009-2012, aimed to assess habitat preferences and the interrelations between the density of field roe deer population and the structure and exploitation of farmlands.
The habitat preferences of those animals were investigated for the period of two years in Wielkopolska region, with a radio telemetry method. Density of field roe deer and the structure and exploitation of farmlands, were appraised once in 10 territories situated in a few agricultural areas of western Poland. The variability of population densities was subsequently analyzed in relation to the existence of elements of agricultural landscape which are most pertinent to field roe deer.
The radio telemetry research confirmed the presence of roe deer which throughout the whole year inhabited agricultural areas, entering edges of in-field forests only occasionally. The home range centers of this field roe deer on average were located approximately 1 km from the forest edge and 700 m from buildings. The observed population of field roe deer preferred clumps and belts of trees and shrubs in farmland, including orchards and fruit bushes, which served as both the activity and rest areas throughout the year. Oilseed rape and maize as well as winter cover crops and stubble fields (mainly after maize) turned out to be the preferred elements of arable land. The population of field roe deer in western Poland was distinguished by a spring density at the level of 7 individuals per km^2 (from 1,8 to 14,4 individuals per km^2 in particular areas).
The multiple regression analysis of dependencies between the population density and habitat variables has revealed that the density of field roe deer in western Poland increased as a result of the rise in the share of (i) fields deprived of forest and building areas and (ii) oilseed rape fields. At the same time it has been observed that the increase in clumps and belts of trees and shrubs in farmland led to the decrease in field roe deer density. It has turned out that although the fields with clumps and belts of trees and shrubs were habitat elements preferred by field roe deer during the year, but a high level of them in some territories sometimes limited the density of the investigated population. It was a consequence of the fact that those tree patches and shrubberies occurred as a rule in territories of higher woodiness. Therefore, it provided more favourable conditions for seasonal (summer) dwelling of forest roe deer in agricultural areas which may have led to the increase in inter-species competition in such territories.

P.HW.26

Effect of supplementary feeding on spatial activity of wild boar during the winter season

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KEYWORDS : home range ; supplementary feeding ; telemetry

Supplementary feeding affects the spatial activity of game species. In winter 2012-2013 we collared and tracked seven wild boars (2 adult males, 5 adult females) in National Park Sumava, Czech Republic. We used GPS-GSM collars from Vectronic Aerospace, Germany (GPS device, a GSM module, a temperature logger and an activity sensor). The area is relatively pure and the main core area are spruce forests (>90%). The feeding places are stable, with the regular frequency of feeding (several times a week). During the winter there is a stable layer of snow (20-100 cm). We caught the boars into the traps and after that we immobilized it (mixture of Zoletil+Xylazin+Ketamin). The results showed that there was strong wild boar dependency to feeding stations. Each of them visited the feeding place every night and used the same feeding place whole winter. The activity during the winter wild boars divided into 3 types of behavior : the rest (>75% of daytime), the movement to and back from feeding place (<5% of daytime) and the visit of feeding place (<20 %of daytime). There was strong fidelity to feeding places and strong and to the rest places too. The individual winter home range size varied from 130 ha to 550 ha (MCP). The minimum average walked distance of each boar varied from 500 m to 950 m during whole day. These results showed up : the feeding places are the main sources of food for wild boars during the winter season, and their behavior can be highly regular by using the regular type of feeding management.

P.HW.27

Differential control of body mass and wing loading in disturbed rock partridges

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KEYWORDS : body condition ; disturbance ; galliform ; predation risk

The starvation-predation risk trade-off predicts that animals should lose some weight and adjust wing loading when facing a higher predation risk, but without impairing their fasting and survival performances. This factor has led to particular concern for the conservation of the alpine rock partridge (*Alectoris graeca saxatilis*), which is known to store low fat reserves, and lives in high altitude areas subjected to harsh weather conditions. Disturbance due to leisure activities and potentially high predation risks may also exacerbate the energetic imbalance. To investigate how body mass in this lean species changes in response to increased disturbance events and/or food restriction, we created four groups, each containing 7 males and 7 females, and housed in outdoor tunnel aviaries. Control (Ctrl) and 'Ctrl-30%' groups were left undisturbed with food supplied *ad libitum* in the first case, and restricted by 30% in the second. Birds in the 'Dist-adlib' and 'Dist-30%' groups were subjected to disturbance events for 30 min.day-1 over 7 consecutive days, with food available ad libitum and restricted by 30%, respectively. Disturbance events were carried out during the winter with a radio-controlled car covered with a red fox fur to mimic predation threats. Daily food intake and body mass changes were determined during the trial. We used a repeated measure ANOVA to compare body mass and wing loading changes between groups. The body mass of Ctrl birds did not change ($p>0,55$). Males lost ($p<0,001$) on average 40g (7% of initial weight) to 47g (8%) in the three other groups. Females lost 24g (5%) and 27g (6%) in the 'Dist-adlib' and 'Ctrl-30%' groups respectively, and lost twice as much (48g ca.10%; $p<0,05$) in the Dist-30% group. Wing loading followed the same pattern. Daily food intake did not change ($p>0,11$) in the Ctrl and Dist-adlib group, but as expected it was actually reduced by 30% in both restricted groups. These results show that both males and females responded to the disturbance/increased predation risk by reducing body mass and wing loading without compensating by eating more. A limited weight loss can improve escape capabilities and reduce associated energetic costs under higher predation risk, but conversely to non-galliform species with rather oxydative muscle fibers, body mass changes in rock partridges (characterized by fast glycolytic muscle fibers) seem to be controlled through an other mechanism than only the adjustment of wing loading. Analysis of body composition and energy expenditure associated to escape flights during the disturbance trial, using the non invasive isotopic dilution technique, gives us new evidences on the physiological limits of such a lean bird species in managing body fuels under one and/or two energetic constraints.

P.HW.28

A small scale habitat selection study : the black grouse in Italy and Scotland

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The Italian, British and Central European black grouse (Tetrao tetrix) populations have been suffering an overall decline. In Italy and Scotland the species has both conservation and hunting interests. Information about habitat selection is important to manage game species and for conservation of endangered species since the knowledge of which resources are selected can provide important tools to explain the trend of the species and to manage the habitat with the aim of improving density and productivity. The aim of this study was to identify which environmental variables are mostly selected by males of black grouse displaying during the breeding season and to evaluate the differences in patterns of habitat selection between alpine and Scottish populations. 3 study areas were selected : 2 in the Italian Alps and 1 in Scotland. Manly-Chesson a selection index has been used to compare the proportions of environmental variables measured within a round buffer of 500 m radius around each presence site (lek or single male) with the availability of the same variables for the respective study area. Multiple regression analyses with theoretic information approach and multimodel inference have been used to analyze the effects of habitat characteristics on male black grouse abundance. The results of the Manly-Chesson index showed that both in Italy and in Scotland the black grouse avoids the warmer aspects. On the Alps the altitudes between 1700 and 2300 meters, the slopes between 20° and 30° and, for the land cover types, the subalpine and grazed shrubland have been positively selected. In Scotland the altitudes between 300 and 500 meters, the slopes from 0° to 10° and, for the land use, the acid grass land with Nardus sp., Festuca sp. and Molinia sp., the rare and dense moorland and the rare broadleaved forest have been positively selected. The results of the multi-model inference analysis in Italy showed a positive influence of low slopes, southeast aspect, not-used grassland, shrubland and pioneer vegetation. In Scotland the north-east aspect, the acid grassland, the moorland and the rare broadleaved forest showed a positive effect on abundance of male black grouses.

As a conclusion we suggest the following management guidelines :

- subsidize the alpine pasture and increase the structural vegetation diversity,
- in Great Britain, to create a transitional ecotone between the commercial forest and the pasture, to decrease the sheep pressure and to join it with the bovine one,
- on the Alps to stop the harvest of the species or at least to direct the hunt just on the young males.

P.HW.29

Contemporary condition and the threats to population of Gulo gulo in north-western area

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KEYWORDS : area shortening ; number of population ; species protection

Gulo gulo is one of the biggest species among contemporary fauna of mammals, representating the Mustelidae - weight reaches up to 28 kg. It‘s omnivorous (getter and scavenger) and very strong nomad predator with tremendous individual range. The wolverine is excellently adopting to far distance migrations in conditions of deep snow. This is a Holarctic and Hypoarctic species and the larger part of its area occupies the southern tundra, forest and tundra zone, northern taiga in Northern America and Eurasia. The territory to the north and to the south of this belt is characterized by very small number of this species, and some insignificant transgressions are marked into arctic tundra and southern taiga. In mountain regions the species raises up to tundra belt. The reproductive territory lies in the framework of the northern taiga subzone of taiga zone.
The number of wolverine In the north-western part of its Paleoarctic area (Murmansk, Arkhangelsk, Leningrad, Vologda Regions and Karelia Republic in Russia) was twice more at the edge of 1960-1970 (1) than at present time in 2005-2011 period (2). According to data of Russian State Hunter’s Control, experts assessments and results of winter calculation routes the total number of wolverine population in period (1) was estimated as 2100 animals in studied region and as only 700 animals in period (2)!
There is observing the wolverine’s area shortening in the region. The southern boundary of species distribution has moved northward - more than for 100 kilometers in some places. The main reason is reduction (and even full disappearing in some places) of major feed resource number - the reindeer (Rangifer tarandus) as well as strengthening poacher impact.
For a long time the species hadn’t been considered as hunting object and its catch occasions were very rare. However in the nineties (the end of XX century) the interest to wolverine had arisen and its catch had increased. As a response to this circumstances the license catch had been established, and then license individual catch was introduced and these measures diminished loss to some extent. Last time beginning since 2005 the new anthropogenic threat for wolverine has appeared in the region. Increased number of snowmobile equipment of northern people make the wolverine absolutely helpless during strict persecution in open space. The poacher catch has sharply increased. At present time poacher catch is 2-5 times more than license one (according to different references).
Climate warming influence on wolverine population in the region hasn’t been explored now.
The species is included into regional Red Data Books : Red Data Book of the Vologda Region, Red Data Book of the Murmansk Region, Red Data Book of Karelia, Red Data Book of Nature of the Leningrad Region. The species has the second -Vulnerable and the third- Lower Risk- status of vulnerability. It is necessary not only to include the species into Red data Books and to award nature protective status, but effective measures on wolverine protection and conservation should be provided indeed.

P.HW.30

Artificial wetland for waterbirds in ricefields : traditional human management for sustainable use of agro-ecosystem

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KEYWORDS : biodiversity-artificial wetlands ; community empowerment ; Siberian crane ; sustainable livelihood

The target of NGO/MCCA projects have been the Fereidoonkenar man-made Damgahs in the ricefields wetland area, which was designated as Iran's 22nd International Ramsar Wetland site in 2003. According to the Ramsar Convention, designed to protect the most important wetland sites in the world, (signed in 1975 in Ramsar- Iran), each country agrees to implement its protection as well as to promote the good use of all wetlands, - in this case the responsible government agent being the Department of Environment.

In managing any threatened, inhabited nature reserve, the success of protection depends on the development of a balance between the needs of conservation and wildlife and the needs of local people, and on relations between the managers and the people, where people are directly involved in management of their own environment.

Through much international experience has come the understanding that local NGO's can play an important role in developing good plans with the people in the community, when they are non-commital and independent. But in cultures where traditionally the managers and the people are conceived as separate entities, it is the international advisory community that should transmit and try to implement this understanding.

The Fereidoonkenar Damgah community offers an exemplary case, where the government implements grand international management projects such as SCWP in this Ramsar site in a far away province, managed by the 'top' authority in Tehran , often not only separately but in conflict with the local people who should implement projects in their own region.

In this sensitive situation MCCA/NGO has in a relatively small way promoted the people-oriented approach, where the young and the old in the damgah community felt they were taken seriously as managers of their own 'hand-built' wetland, and were empowered with more knowledge about ways why and how to sustain conservation of the Damgahs, a unique agro-ecosystem in their community, the protection of which is crucial for preserving semi-natural habitats for wildlife, especially migratory waterbirds, in the region.

P.HW.31

Collisions of wild game with trains in central Poland

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KEYWORDS : wild game ; railway tracks ; collisions between wild animals and trains ; Central Poland

Surrounding of railway (railway tracks and their sides) is the area willingly used by animals because of ample food. Studies that were carried out by employees of Department of Forest Zoology and Wildlife Management of WULS on the railway E 20 between Minsk Mazowiecki and Siedlce in the years 2009-2012 were aimed at: (1) identifying species of animals that used surrounding of railways, (2) identifying species of animals that crossed railway tracks most often, (3) identifying species of animals that were killed in collision with trains. The studies were based on round the clock videos from digital cameras located on both sides of railway tracks. During three years of studies 1840 observations of 8 different species of mammals that used surrounding of railway were registered. Those included 4 species of ungulates (moose - 35 observations, red deer - 5, roe deer - 1007, wild boar - 53) and 4 species of smaller mammals (red fox - 522, badger - 5, stone marten - 25, brown hare - 188). Mammals of all the species crossed the railway tracks in every season of the year. During studies on the railway 22 cases of death as a result of train collision were registered. Altogether 9 moose, 2 red deer, 7 roe deer, 15 wild boars, 1 fox and 1 stone marten were killed.

Abstracts
Posters

Tools for management and research

P.TL.01

Camera traps for roe deer population size monitoring ?

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KEYWORDS : capture mark resight ; individual buck identification ; secr ; ungulate management

An efficent management of roe deer in forest dominated landscapes needs solid density estimates. Current estimate methods like spotlight counts or genotyping faeces are imprecise or expensive. Therefore we search for a cheap, practicable alternative method with sufficient precision. The use of camera traps for estimation abundance and density especially for elusive and rare carnivores is common. But abundance-estimation of ungulates like roe deer, red deer or fallow deer by camera traps is rarely applied. Based on a camera trap survey we developed a non-invasive method for density-estimation of bucks by spatial explicit capture-recapture (SECR) method and additionally a abundance estimation with capture-mark-resight methods in MARK for the entire roe deer population.

For the individual identification we used buck's antlers forms. The study area with a size of 3000 ha is located in southwest Germany. From late-March till early May, when hunting paused, we placed 150 strobe flash camera traps at a density of one per every twenty hectare. Camera placement is based on a random grid of 470x470 m. Buck identification is based on average results from three independent researchers. The results are opposed to those of a fecal genotyping session based density estimation of 2012 in the same study area. After our first small scale camera tests on just 700 hectare in 2012 we know that individual identification is possible and buck density estimations differ little between camera trap results (2,3 bucks per 100 hectare [SE: 0,8; CI:1,2 - 4,4]) and fecal genotyping results (2,4 bucks per 100 hectare [SE: 1,0; CI:1,0 - 5,6]). Current results from our 3.000 hectare project will be presented and compared to genotyping results from 2012 and to a terrestrial IR-spotlight-count from April 2013. Based on our experience in 2012 we think our approach could be a sufficient tool for roe deer management in the future, especially because of the possibility to implement local hunters/environmentalists in to the most expensive part the field work.

P.TL.02

Testing the efficacy of a floating multicapture trap for invasive Egyptian geese (Alopochen aegyptiacus)

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KEYWORDS : culling ; invasive alien species ; management ; multicapture trap

The Egyptian goose Alopochen aegyptiacus is native to Sub-Saharan Africa and the Nile Valley. It was introduced as ornamental waterfowl in western Europe in the 17th century. Meanwhile, the species is well established in several European countries and waterbirdsurveys show that it is still increasing in numbers and expanding its range. Although this shelduck relative is relatively small, problems due to overpopulation of this species are comparable to those of larger goose species like greater Canada goose Branta canadensis. The problems include agricultural damage, eutrophication of water bodies and sensitive vegetation types, nuisance through faecal droppings, trampling and overgrazing. As Egyptian goose is capable of using cavities for nesting, there is also anecdotal evidence for disruption of breeding native species through competition for nesting sites. Although several papers have adressed Egyptian goose as a priority species for management in Europe, very little is known about effective methods for population or local damage control of the species. In Belgium, Egyptian goose are culled through hunting. Also egg destruction is practiced as a management measure. Due to poor documentation of the use of these management measures, little is known about their effectiveness or efficiency. Captures of moulting birds, successful in reducing Canada goose numbers, proved inefficient for trapping Egyptian goose. The birds often do not become completely flightless in July, and tend to dive away before they can be caught. Therefore, we explored innovative options for the control of Egyptian goose and developed a floating multicapture trap with a live decoy bird. This cheap, easy-to-assemble and easy-to-operate device is essentially a Larsen trap consisting of three compartments and modified for floating. The cage can also be put on land in the vicinity of breeding pairs. The floating cages will be tested year-round on 20 locations throughout the project area in a standardised design, investigating monthly differences in trapping success. Cages are set up and focused 5 days per month, starting mid-month, on lakes and ponds, evenly distributed over the project area. Locations were chosen outside a 2km radius of one another in order to avoid interference. Decoy birds were sexed and ringed beforehand and were randomly attributed to locations to exclude a potential confounding effect of sex or quality of the birds. We hypothesize that catching success differs between months. Response variables tested include the number of days to first capture and the total number of birds caught throughout the capture week. During the breeding season, additional traps will be placed in breeding areas close to the nest. For larger, post-breeding concentrations of Egyptian goose (e.g. during the moult period), a specifically designed clap net will be tested. Here, we only report on the set-up and preliminary results of a one-year (2013) field trial with floating multicapture traps. This field trial is carried out within the framework of the Interreg IV-A 2Seas project RINSE (Reducing the Impact of Non-Native Species in Europe, www.rinse-europe.eu) which seeks to improve awareness of the threats posed by invasive non-native species, and the methods to address them.

P.TL.03

Is there a relationship between hare density and soil type?

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KEYWORDS : bag statistics ; GIS

Bag statistics can be used to show differences in hare density between regions.Research in the past has shown that in the Netherlands on average 30 - 40 % of the hare population is shot in autumn. A lot of research has been conducted on the relationship between agricultural characteristics and hare density. But little or nothing is known about a possible relationship between hare density and soil type. In order to investigate the existence of such a relationship, GIS was used in our study. Dutch bag statistics (as an indicator of hare density) per Game Management Unit and the Dutch soil map were compared. This was also done per province. The result of this comparison for the province of Friesland shows a clear relationship : on sandy soils the number of animals shot is very low compared to the number shot on marine clay soils.The resulting map for the Netherlands also shows a clear relationship between bag statistics and soil type. However, it became also clear that large differences exists between marine clay soils in the province of Flevoland and those of other regions of the Netherlands.
Why are there more hares on marine clay soils and on bogland (roughly the western and northern parts of the Netherlands) than on sandy soils (the eastern and southern parts of the Netherlands)? Possible explanations are :

- On sandy soils large areas are grown with maize, which is not a suitable dietary crop for hares.
- In the Netherlands sheep are more common on sandy soils, cows more common on bogland and marine clay soils. On the short sheep grazed meadows there is less cover and less food for hares than on cow grazed meadows with longer grass.
- Predators, like fox and stone marten, are inhabitants of old in our eastern parts. Their presence in our western parts is of more recent years. So maybe hare density in the eastern parts was always lower than in the western parts.
- Marine clay soils and bogland are generally richer than sandy soils, so vegetation on marine clay soils and bogland will have more nutritional value for hares than on sandy soils.
  Is there an explanation for the difference in hare density between the marine clay soils of the province of Flevoland and the other regions?
- The province of Flevoland is characterised by very large agricultural fields, which have relatively few road-sides, sides of ditches and field margins, where hare prefer to feed and can hide.
- Beside this, predation by foxes could play a bigger role in this province than in the other marine clay regions.

In the next couple of years we intent to use GIS to investigate the relationship between hare density (hare counts as well as bag statistics) and soil fertility, land use and, if possible, the presence of diseases.

P.TL.04

Effects of weight and temperature on defecation index of caged European rabbits

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KEYWORDS : abundance or density ; Oryctolagus cuniculus ; pellet count

Introduction
Direct and indirect methods are currently used to estimate wild rabbit abundances and population trends. Pellet counts in cleared plots per unit area is a good indirect method to estimate rabbit abundance at small level (protected areas or game farms) as can latrines per unit of distance is a good indirect method to estimate rabbit abundance at larger scales. Nevertheless, to estimate absolute densities, it is necessary to correct for defecation rates and ground pellet persistence. While pellet persistence must be relieved in the field during pellet count, defecation index cannot be relieved during pellet count and a general or bibliographic value is commonly used to estimate absolute densities. However defecation index is influenced by several factors so that general value can lead to biasing, for this reason we studied the effect of the rabbit body weight and the ambient temperature on the defecation index.
Material and methods
The study involved 12 captivity-born adult European rabbits coming from Tuscany (Italy), weighting 1,604-2,512 g. Rabbits were individually caged and fed ad libitum with a commercial pellet (17.4% crude protein, 17.2% crude fiber, 2.6% crude fat, 10.1% ashes, and 40.9% N-free extract) and alfalfa hay; water was also provided *ad libitum* by nipples. After a period of adaptation to cages the animals were submitted to two different ambient temperature 10°C and 18°C. The total number of faecal pellets dropped per rabbit was measured every day during five non consecutive days at each temperature. One hundred pellet from each rabbit was used for the dry matter determination. Data collected were submitted to multiple regression analysis to predict the defecation index in relationship to rabbit weight and ambient temperature.
Results
The average weight of the rabbits was 2.02±0.344 (Kg±std.dev); the number of fresh faecal pellets dropped per rabbit in 24h was 293±33.4 (n±std.dev). The weight of fresh faecal pellets dropped per rabbit was 114±20.4 (g±std.dev). The weight of dried faecal pellets dropped per rabbit was 57±4.8 (g±std.dev). Relationship between number of excreted pellet and weight with temperature were : defecation-index number = 317 + 46*weight -10*Temperature (R2Adg=0.82); defecation-index dried-weight = 35,4+ 15,45*weight -1.47*Temperature (R2Adg=0.93).
Discussion
Although data from captive animals are open to objections, these first results can be used to improve rabbit density estimations. Our results show that, to compare data coming from different populations and seasons, the defecation index of the wild rabbit should be adapted to the body weight which characterizes the populations to be censused and the different average temperatures observed during the pellet counting. The weight of dried faecal pellets collected in cleared plots per unit area seems a better parameter than the number to estimate the rabbit population size.

P.TL.05

Mapping of crop damages caused by wild boar with KAP and GIS support

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KEYWORDS : crop damages ; GIS ; kite aerial photography ; Sus scrofa

Usually economic damages in agricultural crops are estimated in many different ways between the farmer and the hunter or a third appointed person is activated in case of discordance. But anyhow, the damages are estimated. Many new technologies simplified and optimized mankind's life and this is another attempt for a relative cheap and simple method of damage calculation.
We checked the fields for damages with the so called kite aerial photography technique (KAP). With this method a camera is fixed via a rig on the line and lifted up by the kite into the air to take photos. We used a 2 m hexagonal kite to lift the water- and shockproof GoPro HD Hero 2. This camera can take photos in a quality of 5 and 8 MP and has a FOV of 127° and 170°.
Fields of barley, wheat, rye and rapeseed have been checked on a first overrun short time before harvest by flying the kite with the camera over the fields, always considering the wind direction. On this 'search modus' the height of the camera was somewhere between 50 and 70 m making a photo of 5 MP with 170° every 10 seconds. In fact, that the identifiable areas of the photos were about 200 x 180 m, some fields larger 200 m had to be controlled with a second run using the parallel tractor tracks inside the fields.
Detected damage was inspected in the field to assure wild boar via droppings as origin. In a further step, color marked pickets were placed in a distance of about 40 m around and within the damaged area. The GPS position of each picket was captured with a mobile mapper running ArcPad® 10. Afterwards again photos with 8 MP and 127° were taken picturing an area of about 90 x 70 m. The photos were georeferenced in ArcGIS® 10 combining the GPS points with the colored pickets in the pictures and in a final step, the damaged areas were calculated by drawing polygons over the concerning areas.
Using the KAP technique without further GIS calculations just to make some photos of a damaged field could be either way a good, fast and relative cheap method for a more precisely damage estimation.

P.TL.06

Genetic structure, phylogenetic relationships and forensic DNA of the Cypriot mouflon (Ovis orientalis ophion)

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KEYWORDS : conservation management ; microsatellite DNA ; mitochondrial DNA ; poaching

The European mouflon (*Ovis musimon*) inhabited the Mediterranean islands from 9000 years B.C. While some authors suggested that this taxon should be considered as a subspecies (*O. orientalis musimon*) of the Asiatic mouflon, recent investigation of Mediterranean populations disclosed genetic traits of the first wild sheep mostly in the genome of the Cypriot mouflon (*O. o. ophion*), a subspecies regarded as endemic to the island. The mouflon is the largest wild terrestrial mammal of Cyprus. The population (c.a. 3000 units) inhabits the mountainous Paphos forest (620 km^2) and adjacent forest areas. The mouflon (and its habitat) is protected under the National Law 152 (I)/2003 for the Protection & Management of Wild Birds and Game Species, listed in the Annexes II and IV of 92/43 Habitats Directive, included in the Appendix I of CITES, and classified as 'vulnerable' by the IUCN. Poaching, habitat loss, road network and infection from pathogens threaten the subspecies. We attempted to assess the genetic structure and phylogenetic placement of the Cypriot mouflon population to aid management and create a genetic database to contrast poaching activity. We investigated blood samples of 63 Cypriot mouflons collected across the entire species' range. All samples were genotyped at 12 loci of the microsatellite DNA (Short Tandem Repeats, STR) and a subset of 28 samples were sequenced at the Cytochrome-*b* (Cyt-*b*) gene of the mtDNA. We used both Cyt-*b* and STR loci to investigate mouflons from Italy (blood, hairs : Sardinia, 15; peninsular Italy, 10; other islands, 3) and Corsica (faeces, 13). Further 16 Cyt-b mouflon sequences (Corsica, 3; Turkey, 5; Armenia, 1; Iran, 7) downloaded from GenBank were investigated. We also analyzed samples (blood, meat, hairs : 30) confiscated by the Police and referring to several cases of suspect poaching occurred between 2008 and 2013 in Cyprus. The Cypriot mouflon showed a unique Cyt-*b* haplotype, which was very close to those hold by O. orientalis specimens from Iran and Armenia, suggesting that the species was introduced to Cyprus from the Asia Minor. A remarkable divergence between two major mtDNA clades was found (population pairwise FST = 0.79, $p < 10\text{-}5$) : Corsican and Italian mouflons strongly diverged from those inhabiting both Cyprus and the Asia Minor. Similarly, the STR genotyping of Mediterranean populations pointed to the divergence between West Mediterranean (Italy and Corsica) and Cypriot mouflons, whereas only weak genetic structure was found in the Cypriot population. A mtDNA and STR database was created so far for the Cypriot mouflon. This database worked reliably for identifying the species to which the samples confiscated by the Police came from and, when needed, for matching exhibits (from items belonging to the suspects) to mouflon carcasses recovered in the wild. Regrettably, in most of the cases (24/30) the mouflon was the poached species, a minor number of cases referring to other animals (wild boar, horse, domestic goat and cow). This study represents the first genetic investigation of the Cypriot mouflon and the first forensic DNA data used to protect wildlife in Cyprus.

P.TL.07

Which type of hares? Spatial behavior of two differently bred samples of European hare

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KEYWORDS : habitat selection ; hare management ; home range ; Lepus europaeus

Our study focused on habitat use of 21 radiocollared European hares in a mountainous area in Tuscany from February to September 2010. The whole sample was constituted by hares of different breeding typologies :10 hares farmed in cages (farmed hares) and 11 hares bred in a fenced natural area (captured hares). Farmed hares showed smaller home ranges than captured ones during the second bimonthly period, corresponding to the rutting period; while during the first and third bimonthly periods (pre-rutting and post-rutting period, respectively) the hare spatial use was not statistically different for the two typologies. The average home range size of captured hares during the second bimonthly period was 35,5 ± 15,8 ha; whereas farmed hares' home range was 19,4 ± 6,3 ha. Mean distance between the centres of the bimonthly home ranges was different in relation to the considered typology. The survival rate of the two monitored samples was similar. Farmed hares increased their movement range and reached the maximum spatial use measured for captured ones later than the latter. This aspect could influence the mating success and the consequences related to population density along with useful insights for hunting management.

P.TL.08

Exclosures for determining the effects of moose browsing on young Scots pine volume production

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KEYWORDS : cervid ; damage ; forestry ; Sweden

In Sweden moose (Alces alces) and other cervids browse on young Scots pine (Pinus silvestris) during winter and to a lesser extent also during summer. The browsing may result in different types of stem damage (through e.g. stem breaking and bark stripping), as well as damage due to loss of green needle biomass (through consumption of lateral shoots). The first mentioned damage leads to permanent and unwanted structural changes in the wood, from forestry point of view reductions in wood quality. The loss of green needle biomass reduces the photosynthetic ability of the trees and may thereby lead to reduced growth, in terms of height and volume. The consequences of moose browsing for the Swedish forestry sector are probably high yearly costs with respect to reduced wood quality and production. Exactly how high the economic losses are has never been determined because relevant data are missing. Traditionally, research and survey efforts in this field have been focused stem damage, whereas very little attention has been given to the effects of loss of photosynthesizing biomass for growth. However, recent research by Pettersson et al. (2010) indicated that the final costs of the loss of volume production caused by moose browsing may be even higher than the costs related to reduced wood quality due to structural damage. These results came from an area in central Sweden, which was heavily browsed by extremely high moose densities 30 years ago, and are difficult to extrapolate to the situation in Sweden today, as the browsing pressure generally is much lower. However, the results showed an urgent need for establishing a similar study relevant for contemporary conditions. We here present a new exclosure study, which aims at determining the effects of low to medium browsing pressure on tree volume production losses and quality reductions in typical Swedish pine forests, as well as the final economic consequences of the browsing for the forestry sector. Exclosures, 40x80 m, and non-fenced plots will be established prior to planting in 21 clearcuts across Sweden. Stand properties, e.g. productivity, tree species mixture, stem density and spatial distribution of stems will be studied and related to the browsing patterns. Moose density will be monitored through recurrent pellet counts. The plots will be followed during a long period, even after the trees have grown out of moose browsing height. This is necessary in order to follow stand dynamics initiated by moose browsing. The effects of the browsing will be evaluated on both tree and stand levels, because different processes connected to the damage levels are likely to operate on different spatial scales. The final results will increase the current knowledge about this sparsely studied aspect of tree-browser interactions, as well as the help making wise and relevant future management decisions regarding an important issue for Swedish forest and wildlife sectors.

Pettersson, F., Bergström, R., Jernelid, H., Lavsund, S. and Wilhelmsson, L. 2010. Long-term effects of moose browsing on Scots pine. (In Swedish with English summary) Skogforsk Redogörelse 2, Sweden.

P.TL.09

Eurasian lynx population model and scenarios of future population development under varying hunting pressure

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KEYWORDS : bayesian ; Eurasian lynx ; hunting pressure ; population model

We wanted to create scenarios of future Eurasian lynx Lynx lynx population development under different hunting pressures. In order to do this, we created a Gompertz-type time series population model (base data from year 1998 until 2011). Because in Finland the population estimation for lynx is done with a method that uses observations of lynx family groups, we used yearly family group numbers to calculate population growth rate. We also included factors such as hunting mortality and the proportion of the hunted females over 3 years in the population model. To get the Bayesian posterior distribution for the different factors we used Marcov Chain Monte Carlo (MCMC) method in BRugs 0.8.0 together with OpenBUGS 3.2.2 in R. As a result we produced an optimized model that gives predictions with different probability distributions about the number of family groups (breeding females) from year 2011 until 2015 under three different levels of hunting pressure. If no hunting pressure was present, the population growth was on average 20% per year. Estimated maximum sustainable yield (stable population) was on average 16% of the estimated total population. With 10% hunting pressure strong population growth was predicted (growing population). 20% hunting pressure created a decreasing population. Since Eurasian lynx population has been increasing for several years hence the yearly hunting, these kinds of analysis and population scenarios bring new tools for lynx population management in Finland.

P.TL.10

Influence of mast production on reproduction in wild boar

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KEYWORDS : carry-over effects ; fetus mass ; food availability ; litter size

Previous studies on birds and mammals have highlighted that the environmental conditions experienced by an organism either early in life, recently or currently influence its individual performance during adulthood. Wild boars (Sus scrofa scrofa) face highly variable and unpredictable environmental conditions as they mostly feed on forest mast, which is a yearly fluctuating resource. The wild boar is a relevant case to test for possible effects of food availability on litter size and on fetus mass. Indeed, wild boar sows produce a large range of litter sizes (from 1 to 14 in our study area) with highly variable fetus mass both within and among litters. Here, we assess the effect of recent and current mast production on litter size and fetus mass within a litter. Using a long-term population monitoring, we tested the occurrence of carry-over effects by assessing whether mast availability of the previous year influences litter size and/or fetus mass within a litter of the current year. In addition, we tested whether current mast conditions influence reproductive components of the current year. The implications of our findings for wild boar management are discussed.

P.TL.11

Falconry methods as tool for rehabilitation of helpless free ranging birds of prey

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KEYWORDS : falconry ; raptor ; rehabilitation

Helpless free-ranging birds of prey require major attention by means of animal welfare (Richter & Hartmann 1993). Certainly, the first intention is to help the individual bird. However, caring about such an animal may cause severe suffering as well. Aim of the intervention must be full ability to survive and reproduce in the wild. Keeping adult invalids in captivity is problematic in any case. Korbel et al. (2005) provides an assessment-scheme to decide on therapy or euthanasia from an animal welfare point of view.
Chicks without physical problems have to be raised without being imprinted to men. After fledging they need some weeks still being fed by their parents - or by men. Reintroduction to the wild can just be done by the falconry method of hacking, or by fostering by a conspecific wild pair.
Intact primary feathers are most important for adult patients otherwise they cannot hunt sufficiently. Every housing and handling has to protect these feathers. Tethering with jesses is a falconry method, that is proven for centuries, to protect the primaries (Richter & Hartmann 1993).
Birds of prey are visual-orientated, therefore taking their vision reduces stress, avoid bating and save feathers integrity. To reach this, hooding is a falconry method which is successfully proven for centuries.
Birds of prey receiving treatment or being in captivity for more than two weeks have to be assessed for their hunting ability prior release. Mostly they will need a training based on falconer's methods (Lierz et al. 2005) to improve their body condition. These methods imply a certain taming, because the bird has to react to food provided by men. Dependent of the species of the bird of prey several technics are available (Lierz et al. 2005).
Lure training : fast falcons are not able to fly narrow turns while stooping. If one attracts them with a lure and pulls the lure away close to catching, they have to fly another round. The number of rounds can be raised up from day to day. The velocity while stooping and the number of rounds give a good impression about the fitness of the bird. This method does not fit with birds like Goshawks, Buzzards or Eagles, because they can turn and reach the lure easily.
Training to the fist : food on the fist will attract the bird. Most efficient is the training if two persons call the bird from one fist to the other.
Balloon or kite training : the lure will be fixed at a balloon or kite, so the bird has to fly strait up and strengthen its mussels.
Telemetry, as it is used by falconers, is a reliable method to proof if a released bird will survive (Lierz 2013, in press).

P.TL.12

Use of pellet count in the European hare

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KEYWORDS : censuses ; land use ; mountain

Introduction
The European Brown Hare (Lepus europaeus) is a wide-distributed lagomorph and a countryside flagstone species. The reduction of its number, observed in many Countries during the last decades, has led many researchers to better investigate its ecology to improve its management. The base of wildlife management policies is the knowledge of a population consistence; for this reason hares are usually monitored by spotlights counts in their ecosystems, in Italy mainly characterized by agricultural land uses localized in lowlands and hilly environments. However several hare populations also live in Mediterranean woodlands and mountainous environments, where the lack of monitoring tools does not allow a correct management. For this reason we started to investigate their presence and habitat selection in such environments by pellet-count based techniques.

Materials and methods
We used two protected areas (where hunting is not allowed) and one farmland located in the Tuscan Apennines (area approx. 900, 181 and 120 ha and average altitude 950, 1100 and 1250 m) to detect habitat selected by hares in this mountainous environment. We randomly selected 178, 37 and 40 plots (3 m^2 each) inside each area. Plots were chosen in different soil cover classes; selected land uses were : meadows and pastures, coniferous woodlands, chestnut, beech, mixed deciduous forest, mixed coniferous and broad-leaved woodland, shrubs. Pellet presence/absence was checked in each plot, starting from April every 30 days. To estimate hare population, we compared consistencies obtained by two different techniques : pellet counts (the Fecal Accumulation Rate method and the Fecal Standing Crop method) and spotlight counts. Consistency checks were carried out in a protected area (area approx.900 ha and average altitude 950 m) and in two hunting estates (area approx.16 and 370 ha and average altitude 850 and 120 m), regularly checked by both public and private gamekeepers. Pellet decay was calculated in each protected area by placing 800 fresh dungs in 16 small enclosures and recounting them in correspondence of the pellet counts of cleared plots. Expected land uses were analyzed by Jacob's index of preference, chi-square and Bonferroni confidence intervals. Population censuses were submitted to regression analysis and the effect of different sampling intensities was evaluated on the accuracy of the estimates.

P.TL.13

Bioindicators for measurement of red deer pressure on understory vegetation in temperate deciduous forest

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KEYWORDS : Cervus elaphus ; forest-game balance ; indicators ; temperate deciduous forest

Increasing deer populations often leads to a mismatch between interests of hunting and other functions of multi-objective forestry (economic timber production, biodiversity, recreational use). The assessment and monitoring of the balance between deer populations as required for hunting and impacts on other forest functions require reliable tools such as ecological indicators. This paper reviews ecological indicators that characterize the pressure of red deer (*Cervus elaphus* L.) on understory vegetation in temperate deciduous forest. Firstly the wide variety of available indicators is explored. Parameters include recovery, height, stem density, biomass and species diversity. These indicators as well as the corresponding indicator plants are then discussed. These plants belong to the herbaceous, forest regeneration or specific species. In particular, the effect of plant palatability is examined in regards to indicator efficiency. In conclusion, these indicators can provide reliable information as they take into account biodiversity, the carrying capacity of the environment and deer populations. They are valuable tools for forest managers to diagnose the forest-game balance.

P.TL.14

Introducing a new annual shooting bag survey for the UK

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KEYWORDS : bag statistics ; shooting ; survey ; UK

The UK is home to nearly half a million hunters, hosts around ten million shooting (hunting) days a year, and owes the management of approximately two-thirds of its rural land to shooting-related activities. A wide range of species can be shot, either during specified open seasons or year-round under the terms of general licences. In the UK, keeping a record of shooting trips and bags is one of the oldest sporting traditions. But in addition to being a useful personal record of shooting activities and success, bag records can also provide invaluable data to help demonstrate the sustainability of shooting.
The collection of hunting bag information is encouraged by the EU Council Directive 2009/147/EC on the Conservation of Wild Birds, which calls on Member States to ensure that hunting is 'compatible with maintenance of the population of these species at a satisfactory level.' In addition, the African-Eurasian Waterbirds Agreement (AEWA) recommends bag data particularly for species of unfavourable conservation status. Various schemes are in place in many countries in response to these needs.
Two voluntary programmes for the gathering of hunting bag data in the UK have been run for many years by BASC (*Waterfowl Shooting Survey*) and the Game and Wildlife Conservation Trust (National Gamebag Census). BASC began its survey in 1979 (but suspended it in 2003) and the *National Gamebag Census* (NGC) began in 1961. The NGC is particularly well placed to gather information on gamebird shooting, because it collects information from large numbers of estates and shoots. BASC surveys focus on individual shooters, and are particularly useful for collecting bag information for migratory waterfowl and 'pest' species. The two schemes are complementary. A government-funded joint study has shown that combining the two schemes could provide good coverage of UK shooting particularly for the widespread and abundant huntable species.
BASC has re-launched its annual bag survey in the form of the *BASC Gamebook*. Every year it will be provided for respondents to use for their personal records and then BASC will collate and analyse the data. Over time, we will produce shooting bag trends to overlay with population trends for key huntable species to help assess the sustainability of shooting in the UK, and contribute to similar schemes at international level.

P.TL.15

Meta-analysis : A need for well-defined usage in ecology and conservation biology

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KEYWORDS : meta-analysis ; method ; review ; statistics

Meta-analysis is a powerful research summarization technique. The advantages of meta-analysis have also been recognized in the fields of ecology and conservation biology with the method becoming increasingly popular since the 1990s. 'Meta-analysis', however, is not well-defined in these fields, but is regularly confused with other summary analysis techniques, such as multiple regression methods, vote-counting or other quantitative analyses. We argue that this vague and inconsistent utilization of the term is problematic, because a meta-analysis typically provides scientifically rigorous results. We therefore advocate a consistent and well-defined usage of the term in our disciplines, based on the standardized definition applied in the medical sciences. We conducted a literature search for meta-analyses in the Web of Knowledge and determined steps that in our opinion and based on standard meta-analysis literature from the medical sciences are mandatory for meta-analysis. We rated articles according to these steps. Of the 133 evaluated articles 25% did not fulfill any of the requisite steps for a meta-analysis. Our findings highlight the ambiguous and vague usage of the term 'meta-analysis' in ecology and conservation biology and underline the importance of a consistent and clear definition. We conclude with recommendations on how the term should be applied in the future.

P.TL.16

Larsen cage traps : do they work for Carrion crow and Jackdaw ?

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KEYWORDS : call-birds ; capture efficiency ; Flemish policy ; Scandinavian crow traps

In Flanders the use of Larsen cage traps is only allowed for the capture of Magpies (*Pica pica*). For the Carrion crow (*Corvus corone*) only the use of shooting and Scandinavian crow traps is allowed, Jackdaws (*Corvus monedula*) even can only be shot. As both species can cause agricultural damage (Bos & Vugteveen 2005) and (in the first place Carrion crow) are predator species (Vermeersch 2004a), the recent population increase of both species (Vermeersch 2004a en b; Bos & Vugteveen 2005; Scheppers & Casaer 2008) calls for extra regulation possibilities. In comparison with the Scandinavian crow trap, the Larsen cage trap has some practical advantages being small and removable. Besides, it permits an efficient predator control by moving from nest to nest thus preventing reproduction. As predation can in first place be attributed to corvid pairs with young, predation is expected to lessen when Larsen cage traps are used (De Smet & Roggeman 2002; Game & Wildlife Conservation Trust 2008). As Larsen cage traps work with the principles of territoriality, the use of call-birds is reported to enhance capture efficiency based on research in Great-Britain (De Smet & Roggeman 2002; Game & Wildlife Conservation Trust 2008).
To judge whether this research holds true for Flanders, Hubertus Vereniging Vlaanderen in 2012 coordinated a pilot project investigating if the use of Larsen cage traps could improve the management of Carrion crow and Jackdaw. Additionally the project aimed to estimate if the use of call-birds could enhance the efficiency of the Larsen cage traps. In order to estimate capture efficiency, the number of Carrion crows, Jackdaws and Magpies captured per day was compared between Scandinavian crow traps (n = 5) and Larsen cage traps (n = 20). Within the Larsen cage traps four distinct treatments were investigated (no call-bird, Magpie call-bird, Carrion crow call-bird, Jackdaw call-bird). The project was executed in Wildlife Management Unit 'Generale Vrije Polders', in the north of East Flanders.
Capture efficiency of Carrion crow was similar in Larsen cage traps (mean of 0.348 crows a day) and Scandinavian crow traps (mean of 0.332 crows a day). For Jackdaw, a higher capture efficiency was measured in the Scandinavian crow trap (mean of 0.942 jackdaws a day) compared to the Larsen cage trap (mean of 0.559 jackdaws a day). However, as only one Scandinavian crow trap was used in combination with a Jackdaw call-bird, conclusions cannot be drawn. The project confirms a considerable improvement in efficiency when a call-bird of the same species as the target is used. In cages where no call-bird was used almost no birds were captured. These results are relevant to the Flemish policy, suggesting the use of Larsen cage traps should be permitted for the capture of Carrion crow and Jackdaws and that the use of call-birds should be encouraged.

P.TL.17

Population dynamics of wild ungulates in Poland estimated by different methods

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KEYWORDS : collect hunts ; driving census ; large sampling plots ; line transect

Population estimates are presented for moose (Alces alces) in the Augustowska Primeval Forest (110 thousand hectares), wild boar (*Sus scrofa*) in the Bory Dolnoslaskie forest (67 thousand hectares), fallow deer (*Dama dama*) in the Bory Tucholskie forest (16 thousand hectares), roe deer *(Capreolus capreolus*) in the Lasy Slaskie forest (19 thousand hectares), red deer (Cervus elaphus) in the Bory Stobrawskie forest (90 thousand hectares) and in the Beskid Zywiecki mountains (25 thousand hectares). The population densities for moose, red deer, fallow deer, and wild boar were estimated by tracking them on line transects and by large sampling plots (400 - 500 hectares). The driving census method and analysis of the harvest in collect hunts were used to estimate population density and number of roe deer. Over four years, the population density of moose fluctuated from 1.6 - 2.2 individuals/ 1000 hectares of forest, wild boar - from 15.4 - 25.3 individuals / 1000 hectares of forest, fallow deer - from 86.9 - 93.7 individuals/ 1000 hectares of forest, and of roe deer from 198 - 203 individuals/ 1000 hectares of forest. In 2000 - 2012, the population density of red deer increased from 30.0 to 48.0 individuals /1000 hectares of forest in the Beskid Zywiecki mountains, and from 45 - 120 individuals/ 1000 hectares of forest in the Bory Stobrawskie forest. The analysis of the obtained results indicate that for all species studied, tracking on transects and the analysis of numbers culled in collect hunts are reliable methods for estimating population numbers. The large sampling plots can be applied to estimate population numbers of moose, red deer, fallow deer, and wild boars, whereas the driving census is a reliable method for estimates of population number of roe deer. The data obtained in our study are 2-3 times higher than estimations made by hunters of the numbers of red deer, roe deer, wild boars, and fallow deer, and 50 percent lower than hunters' predictions of the moose population. It is suggested that a national census of these species should be performed in the near future using the reliable methods presented in this work.

P.TL.18

Population numbers and densities of wild ungulates in north-eastern Poland

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KEYWORDS : driving census ; harvest planning ; line transect ; snow tracking

The study area covers 325 thousand hectares adjacent to the Polish-Russian border, where small forest complexes occupy a combined area of 75,100 hectares. These are chiefly state forests administered by 4 forest districts (Górowo Ilaweckie, Mlynary, Orneta, and Zaorowo) under the jurisdiction of the Regional Directorate of State Forests in Olsztyn. In February and March 2013, the population numbers of red deer, roe deer, and wild boars were estimated by tracking on transects, and by driving census (roe deer). On marked transects (50km/ 10 thousand hectares of forest) run through forest roads and forest compartment-dividing roads, driveable in winter, relative population density indices (N/ km of transect) were determined by snow tracking on 5 consecutive days. The indices obtained were then converted into absolute population densities (N/ 1000 hectares of forest) using non-linear regression. The roe deer population was also determined by driving censuses on small sampling plots (75 - 110 hectares), in each cases involving 40 - 50 people. The results indicate that the study area is inhabited by 2,681 red deer, 14,778 roe deer, and 6,340 wild boars which corresponds to population densities of ca. 35.7 red deer, 196.8 roe deer, and 84.4 wild boars / 1,000 hectares of forest, respectively. The population densities of the studied species was very variable between individual forest districts and ranged from 27.4 - 43.1 red deer / 1,000 hectares of forest., 134.1 - 274.6 roe deer / 1,000 hectares of forest, and 56.3 - 109.2 wild boars/ 1,000 hectares of forest. The data obtained was used to develop culling plans for these populations for the 2013/2014 hunting season. It is assumed that in the area of all these forest districts the hunting of wild boar will aim at reducing their numbers. The culling of red deer should reduce their number in the Górowo Ilaweckie and Orneta forest districts, while the harvesting of roe deer should reduce their numbers in the Zaporowo and Górowo Ilaweckie forest districts. It is suggested that, in years to come, numbers of big game animal species should be professionally monitored with animal observations (red deer, roe deer) and analyzing the numbers culled in collect hunts (wild boar).

P.TL.19

Evaluation of knowledge hunters' : case of night hunting waterfowl

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KEYWORDS : bird observations ; Gironde wetlands ; local knowledge ; teal

Introduction
As a popular activity, the hunt presents an important socio-cultural diversity according to its practitioners. Most of the time this can be showed through different approaches, with hunters instead of 'predators', seeking a maximum harvest, when others, rather managers, focusing on maintaining sustainable populations and environments. For those last mentioned, manage or develop mobilizes knowledge regarding the species and/or the environment (Alphandéry & Fortier, 2007). But is it knowledge of external origin (*e.g.* from science) or is it produced by the hunters themselves? This paper assumes that the hunting community itself produces abundant knowledge. The challenge for management (or science) is to assess the validity of these (Gilchrist & al, 2005). Three levels are distinguished : pragmatic knowledge to harvest, those relating to management and those recovered in the scientific field. Based on night hunting waterfowl, we will seek to assess the richness and relevance of scientific knowledge mobilized by hunters.
Study area and methods
This hunt involves spending the night in a fixed installation located near a water point. These practitioners are privileged observers of the movements of the birds, migratory or more local. If oral transmission provides information, it is difficult to work on during long periods. To keep a paper record seems more reliable and regular. Night hunters take their own notebooks, with rich data (landings, harvests, observations of birds, abiotic conditions …). The main material of this study consists of these books and usability of information they contain.
The study area is *Gironde*, a French department with more than 60,000 hectares of wetlands, which a significant portion is hunted (2200 huts listed which 1100 active). 52 facilities have provided their books in several areas popular for night hunting waterfowl. The information contained fed a database. It includes data on landings and harvests by species, time (date, hour…), the abiotic conditions (wind, weather, moon) and observations of birds (by species) in time.
Results and discussion
Disparities are found between hunting facilities, as the information are not recorded with the same rigor. The only comments coming back repeatedly landings, harvests, as well as the time and date. For the remaining data, a sorting between observers should be performed before considering their data as unreliable and potentially use (David & Wagner, 2003). The nocturnal origin of these data inform us at times when scientific information is lacking. Teal (*Anas crecca*) was the subject of a more advanced approach of both sectors (*lac de Carcans-Hourtin* and *Marais du Blayais*) including the evolution of its presence during periods of wintering seasons (2009-2010 and 2010-2011). The variation suggests peaks certainly related to the migration periods when others are more tenuous in terms of abundance, although Teal are still observed. A further study on the potential presence of waterfowl feeding grounds (see Guillemain & al, 2002 or Baldassarre & Bolen, 2006) should be conducted in order to consider management measures.

P.TL.20

Monitoring a Partridge population in Flanders

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KEYWORDS : hunting bags ; percentage juveniles ; reproduction ; sex-ratio

The Grey Partridge (Perdix perdix) is a red list species considered as 'vulnerable' in Flanders (Devos et al. 2004). Intensification and mechanization of agriculture is widely considered the main cause of this population decline in Europe (Potts 1986; Aebischer & Ewald 2004; Kuijper 2007). However, populations in the province of Western Flanders are doing better in recent years as shown by the often increased hunting bags in the period 1998-2011 (Devos et al. 2013). In a three-year project population characteristics were monitored in a sample of between 11 (2008) and 18 (2006) Western Flanders' Wildlife Management Units (WMU). It was estimated if such a monitoring of Partridge populations could deliver useful indices for the evaluation of wildlife management and hunting policy.
In the period 2006-2008 hunting bag records, shooting dates and the left wings of the hunted Partridges were collected each year in the participating WMU. On the basis of Partridge wings, the age but also the sex of the shot bird can be determined. From these data the percentage of juveniles in the population, the sex-ratio and the distribution of hunted Partridges in time were determined.
In total 3.085 individual Partridge wings where collected. 59 %, 48 % and 57 % from these wings were collected from juveniles (< 1 year), in 2006, 2007 and 2008 respectively. The share of juvenile birds in the hunting bag is indicative for the reproductive success, hence providing wildlife management with a suitable indicator for the evaluation of the Partridge management. The sex-ratio was approximately 1 :1 for the juveniles. For the older birds we saw a displacement to 2:3, where the males had a larger share in the population. Probably this can be explained by female birds staying on the nest during breeding season hence being more exposed to predation and agricultural activities (cf. mowing). Again this provides WMU with useful information in the light of sustainable Partridge management. As a last index in the project it was calculated that 90 % of the Partridges was shot between the 15th of September and the 15th of October in the participating WMU which is only the first half of the open period.
Habitat management and predation control carried out by hunters have been shown to considerably improve the Grey Partridge conservation status (Aebischer 1991; Potts & Aebischer 1995; Tapper et al. 1996; Aebischer & Ewald 2004; Ewald, Potts & Aebischer 2012). Importing a ban on hunting in contrast is not enough to ameliorate the status of the Grey Partridge (Bro et al. 2000) and could even work contra productive (Aebischer 1991). In this light the sustainable management of Partridge populations, based on a monitoring, is extremely important. The simple monitoring of population characteristics as executed in this project is proposed as a practical and useful instrument for the evaluation of Partridge management at the local scale. The monitoring also provides useful data for the policy, showing which periods are important for hunting Partridges and should be part of the open period.

P.TL.21

Evaluation of woodcock harvest : use of an adapted statistic methodology, from harvest books

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KEYWORDS : management ; migratory species ; sample

The application of the decree of 31 May 2011, relative to the assessment of woodcock harvest, by the Hunters' Departmental Federations of Aquitaine (South-West, France), is not sufficient to end up satisfactory results, due to the partial nature of individual harvesting books returns in Federations (+/- 37.5 %). To overcome this situation, a broader methodology has been tested in all departments of Aquitaine : it is based on the production of an additional information collected from hunters who did not return their harvest book.
This statistical methodology gives coherent results on the estimate of the regional total birds harvest, its distribution during the season, per month and week, and the daily distribution of the weekly harvested birds.
This study enables to understand the evolution of the woodcocks harvest, which is an important strategic indicator for the management of this species. By repeating such estimates under the same conditions in the following years, it is possible to assure that by using this same protocol, the variations of the order of 5 to 10 % are indeed perceptible.

P.TL.22

A method for molecular diet analysis of wild boar from their feces

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KEYWORDS : 454 sequencing ; biodiversity ; impact ; wild boar

In the current context of the dramatic increase of European wild boar populations, the impact on biodiversity is often cited as an argument to urgently manage overabundant densities. But the impact of this omnivorous species is difficult to assess. The results based on the monitoring of vegetal and animal communities possibly affected by wild boar are difficult to interpret and the conclusions of the literature about this topic are quiet unclear or inaccurate.
We tested an original method based on a genetic diet analysis from feces obtained by next generation sequencing methods (454 sequencing). A total of 500 fecal samples were collected on boar carcasses during the hunting season 2012-2013. The DNA profiles from animal and vegetation fragments present in the feces were compared to a gene database in order to provide the list of animal species and plants species (plant genera or plant families) consumed by wild boar. The sampling was designed to assume a contrasted spectrum of geographical, density and management situations. Collecting occurred in 4 study areas from 3 different regions in Belgium : Hautes-Fagnes Eifel (low density, no artificial feeding), Ardenne centrale (medium to high density, artificial feeding allowed locally), Famenne (high density, no artificial feeding) and one in France : Loiret (high density, artificial feeding). Each of these site is widely concerned by the Natura 2000 network and particularly sensitive to the impact of wild boar on biodiversity. The sampling year was characterized by a very low availability of forest fruit.
The expected results will give the item occurrence within the autumnal diet of wild boar but without information on the proportion of the different items consumed. The influence of density and artificial feeding on the main animal and vegetal species consumed by wild boar in these areas will be highlighted according to the wild boar weight and sex classes and by paying a particular attention to the endangered protected Natura 2000 species. If the results obtained by this study are conclusive, further analyses, of feces collected in the fields during the spring, could be realized to assess a.o. the impact of wild boar on ground nesting birds.

P.TL.23

Urban wild boar management : a resource selection analysis based on eradication data

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KEYWORDS : backyard wildlife ; conflict ; GIS ; prevention

The invasion by wild boar or feral pig of urban areas is a phenomenon widely observed in the world. It may induce many conflicts when ranging in human-dominated areas.

In Belgium, the city of Seraing (suburb of Liège, South-East of Belgium), among others cities, is being faced with wild boar invasion since the late 90's. Its geographic situation is particularly favorable, being surrounded by forest on its southern side and delimited by the river Meuse on its northern side, this obstacle being considered as a serious break for the natural range extension of the species. The forest (around 1200 ha) is mainly made of broadleaved species with some coniferous stands where wild boar has established at the end of the 80's. According to the nature of the ownership, the wild boar management is contrasting : no hunting in the public areas dedicated to tourism on the one hand, artificial feeding and drive hunts in the private ones on the other hand.

In 2010, the municipality faced with too many complaints from the citizens because of the increased wild boar population in the city with individuals showing a very familiar behavior. It was decided to eradicate wild boar in the city and to re-allow hunting in the surrounding public forests. The eradication was implemented according to a regional law on the basis of public health and security. The municipality designated a 'destroyer' (hunter with a special license) and the regional administration gave the authorization for periods and locations of destruction. In each dangerous case, the police call the hunter for shooting the animals. Each observation and shooting place (street name) was registered by the destroyer. From 2010 till end of 2012, he killed 200 wild boars on an area of about 60 ha. In 2013 the eradication plan was stopped because of a lower number of conflicts and / or a modified behavior of the animals being much less familiar (and difficult to shot).

This study aims to analyze the habitat selection by wild boar within the city. We designed a 100 m x 100m sampling grid on the area of interest. The 'use' data are the locations registered by the destroyer from 2010 and 2012. The 'resource' data are static environmental data (area of bushes, broad-leaved and coniferous groves and lawns), infrastructure (density of motorways, roads, railways, garden fences) and proximity to habitats of probable origin of wild boar such as forest edges but also brownfields. We used a logistic regression model (Manly et al 1993) to test the characteristics of each 1ha - square in relation to wild boar presence or absence.

The results should highlight the main variables that explained the presence of wild boar in the city of Seraing from 2010 to 2012. Some management guidelines should help the municipality to prevent new invasions of this conflict species by reducing the attractiveness of the urban landscape in addition to a better control of the forest-living boar population.

P.TL.24

Modeling a Red deer population reintroduced in an area of Northern Apennines (N-Italy)

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KEYWORDS : Cervus elaphus ; ENFA ; monitoring ; PVA

At the beginning of the past Century only two remnant populations of red deer (*Cervus elaphus*) were present in Italy : one in the Eastern Alps (Monastero and Venosta valleys) and the other in the Po Plain near the coast of Adriatic Sea (Mesola Forest). The present Alpine population was originated by immigration from Switzerland, Austria, and Slovenia (Central and Eastern Alps) and by reintroductions (Western Alps), whereas in the Apennines red deer was reintroduced since 1960-70. At present Apennine populations are fragmented and isolated even if an increasing trend of density and occupied range was recorded. We monitored from 2002 to 2012 a protected population of red deer reintroduced in late eighties in the hilly and mountainous areas of the Piacenza province (Northern Apennines), in order to detect changes of population size and range, and to formulate a model of habitat suitability for the prediction of future expansion of population. We carried out counts of roaring males in September of each year and collected systematic observations all year round to define population structure and reproductive success. We used species locations, to define yearly ranges and core areas by Kernel Analyses (KA) at 99% and 50%, curve fit regression to detect trend of the population and its range, and Ecological Niche Factor Analysis (ENFA) to model habitat suitability and potential range. For ENFA we subdivided the study area in 4-km^2 cells and in each cell we measured the altimetry, exposure, slope, and land use variables; the cells where at least one observation was collected in the study period were considered as presence ones. Finally we carried out Population Viability Analyses (PVA) to predict population trend and to explore the harvesting possibility. Deer population showed a slow increasing trend (from 4 roaring males in 2002 to 70 in 2012). Only KA50% resulted in a low increasing trend ($F=13.78$; $df=1$; $P=0.014$; $R2=0.73$). ENFA showed a global marginality of 0.53 and a tolerance of 0.71. The main variables positively related to the marginality were broad-leaved and conifer forests, pastures, East aspect, altitudes from 1000 to 1800 m a.s.l., and slopes between 10° and 30°. The model provided a habitat suitability map that defined a potential red deer range of 580 km^2 (22.4% of the Piacenza province). K-Fold cross validation and ROC curves showed a high predictive power of the model (Rho=0. 96; $P<0.0001$; AUC=0.99; $P<0.0001$). PVAs showed an increasing trend of the population without harvest from 300 to 900 individuals in 30 years (survival probability=1), an increase with a harvest equal to 5% (from 300 to 825 individuals; survival probability=0.99), and a stability but with a low survival probability (0.63) with a harvest equal to10%. Red deer is an important big game species and it has a high conservation value being a selected prey by wolves; however if populations reach high densities they can have a heavy impact on agriculture causing damages in particular on vineyards and orchards. Consequently it is important to maintain populations at sustainable densities by a slight harvesting.

P.TL.25

Wolf habitat suitability in an area of Northern Apennines : a multimodel approach

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KEYWORDS : Canis lupus ; ENFA ; logistic regression ; MaxEnt

The Italian wolf population was near to the extinction at the beginning of the seventies of the past century, owing to indiscriminate hunting and poisoning. In 1972 the wolf was named protected species and since this moment the recolonization of the Italian Peninsula has begun, starting from the remaining part of the range in Southern and Central Italy and reaching the Northern Apennines (N-Italy) during the eighties. This study was aimed to individuate suitable areas for wolves in the provinces of Pavia and Piacenza, that include a trait of the Apennines chain that links the more extended wolf areas in Emilia-Romagna and Tuscany to those of Liguria and Western Alps and where wolves suffer a high mortality due to illegal killings and accidents. From August 2011 to August 2012 we searched for wolf and wild ungulate signs of presence on 25 transect (total length 168 km) covered once a season and randomly located in an 860 km^2 study area. We split the study area in 4-km^2 cells by a grid spaced of 2 km and in each cell we measured the variables concerning altimetry, exposure, slope, and land use. We classified the cells crossed by transects as presence cells if wolf signs were found at least in a season and absence ones if no signs were found. We formulated habitat suitability models following an approach use vs. availability by Binary Logistic Regression Analysis (BLRA), Ecological Niche Factor Analysis (ENFA) and Maximum Entropy algorithm (MaxEnt) and by comparing presence cells with an equal number of randomly selected ones. Moreover we formulated a habitat suitability model following an approach presence vs. absence by BLRA, using only the cells crossed by transects and comparing presence cells with absence ones. For the first approach only the environmental variables were used, while for the second we used also the abundance of wild ungulates. We validated all the models by the K-Fold cross validation and ROC curves. The best model was that resulting from BLRA with presence vs. availability approach, and it was used to create a suitability map for the whole hill and mountainous area of the two provinces (2408 km^2). Potential wolf range was 736 km^2, i.e. 30.5% of available area. The suitability map can be used to the accomplishment of the actions to awaken public opinion towards the cohabitation with wolves and to plan the methods and interventions of damage prevention to the animal husbandry, so reducing the conflicts between human activities and wolf presence. Moreover on the basis of the habitat suitability map a network of protected areas can be designed to improve wolf protection and conservation policy.

P.TL.26

Parameterization of the population dynamics of wild boar in Southern Belgium

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KEYWORDS : bodyweight-structured model ; population control ; shooting plan ; Sus scrofa

The wildlife managers are facing important questions about the control of wild boar populations all over Europe. In some cases, the computation of accurate shooting plan is necessary. The military camp of Marche-en-Famenne (2700 ha) is submitted to a yearly culling plan since wild boar was identified as a possible threat for the rare ground-nesting bird species living there.
This study proposes a modeling approach for the wild boar population dynamics fitting for data usually collected by hunters, i.e. sex and body weight (Gamelon et al. 2012). This model enables us to find the optimal harvesting, i.e. the hunting bag composition to give an increase rate of 1, for a given population.
In order to calibrate this model, natural survival, hunting mortality and fecundity are required. We used a 7-year dataset (2006-2012) of mark-recapture study from the military camp. We assessed weight-specific natural survival (i.e. excluding hunting mortality) and hunting mortality of 327 females and 359 males. In order to assess a weight-specific fecundity, we sampled 168 female's genital tracts. Moreover, hunting bag data from 2003 to 2012 were used.
The military camp shows a very high density of wild boars : a mean number of 290 animals is culled every year. According to the model, the natural survival is about 90% for small and large females (<30kg and >50kg respectively) while for males (<45kg and >75kg) it is approximately 95%. Natural survival of medium-sized males and females are close to 70%. Currently the hunting mortality is about 60 to 70% for small and medium-sized males, medium-sized and large females while it is about 50% for small females.
This model should offer a promising tool for applying selective hunting to the management of wild boar populations in a range of places in Southern Belgium.

P.TL.27

Assessment and monitoring of forest-game balance : an exclosure experiment

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KEYWORDS : enclosure-exclosure ; indicators ; large ungulate ; understory

During the last decades, populations of large ungulate herbivores have increased and their influence on forest vegetation have been clearly highlighted. Therefore, monitoring game pressure have become unavoidable for sustainable forest management. Such monitoring require a rigorous approach in order to evaluate objectively the forest-game balance. Under these conditions, the use of exclosure experiment has appeared an interesting solution. They enable to observe the ecosystem evolution due to forest-game imbalance as well as to detect any early deterioration of a situation that was initially considered acceptable. The enclosure-exclosure devices compare, on the one hand, the real environment (exclosure) fully accessible by wildlife and, secondly, a 'control' fenced habitat (enclosures) inaccessible to all populations of large ungulates (e.g. wild boar, red deer, roe deer and mouflon).
In 2006, enclosure-exclosure devices (4 x 4 m) were installed within forest gaps in order to monitore the understory dynamic in Wallonia. Observations were collected until 2012 and we computed a set of indicators characterizing the ecological changes due to large herbivores pressure on forest ecosystems. Such devices played a key educational role as it provide a visual comparison of two contrasted situations. Additionally, quantitative information were collected to perform further analysis (floristic survey, as well as height, number of stems and the cover of vegetation).
We identified indicators of the ecological changes that responded within two years whereas other indicators required at least 4 monitoring years in order to quantify correctly herbivore pressure. Short-term indicators allow a rapid detection, but they have the disadvantage of being very sensitive to exogenous factors (climate changes, site conditions). At the opposite, medium-term indicators, such as regeneration growth, require a longer monitoring period, but they are more robust (mitigation interannual variations of environmental factors) than the short-term indicators.
We evaluated the relative efficiency of various indicators using 17 enclosures distributed in two zones with contrasted deer densities. Some of the tested indicators allowed detecting significant differences between the two zones (Student's t test). In particular, among the short-term indicators we obtained significant result with the ground vegetation richness, regeneration richness, seedling density and height of Rubus fruticosus L. and Rubus idaeus L.. Among the medium-term indicators, the most relevant indicators were the average height of beech and birch, ground vegetation richness, seedling density and total cover of vegetation.

P.TL.28

Comparison of two methods to assess red deer abundance during the rutting season

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KEYWORDS : camera trap ; capture-mark-recapture ; roaring counts ; wallow

Counts of rutting vocalisations represent one of the methods used to assess red deer stag densities in automn and to extrapolate the results to population trends of red deer populations. The reliability of this method is however difficult to evaluate and it is more and more challenged. Since about one decade camera traps are used as an alternative to study forest dwelling mammals. The use of camera traps allows to obtain data on the presence of elusive species and to assess population densities for example. In our field area roaring counts have been used to assess stag densities for several years. We deployed camera traps in the same area and during the same season to assess the reliability of estimates from counts of roaring stags In addition, we tested if it was suitable as an alternative for assessing densities. First results show that the number of identified individual stags is almost twice as high with camera traps, set up at selected wallows, as compared to the roaring counts. Furthermore, the positioning pattern of camera traps enables one to obtain information about the distribution of the stags. This method seems thus to represent an interesting alternative to the census of red deer. The next step is to try to apply Capture-Mark-Recapture models to get more accurate data on stag abundance.

P.TL.29

Are VLTB real bovine tuberculosis lesions in red deer and wild boar?

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KEYWORDS : health monitoring ; tuberculosis

Bovine tuberculosis is one of the major sanitary and economical problems affecting the populations of domestic and game ungulates. To reduce their impact on domestic livestock costly eradication campaigns are being carried out since decades, involving the identification of infected live animals by immunological procedures, and slaughter of positives, sometimes confirmed by microbiological culture of lymph nodes sampled at slaughter. In big game species, inspections are carried out by veterinary inspectors on the animals hunted based on the identification of tuberculosis-like lesions in the carcasses. Thus, in the wild boar attention is paid firstly to lesions located in sub-mandibular and retro-pharyngeal lymph nodes, as the use to be the gate for the entrance of the mycobacteria to the animal body, and secondly to the presence of lesions, usually caseated foci (whitish-yellowish dense material) affecting lungs and mesenteric lymph nodes. In the red deer, inspections are based also on the search for caseated foci affecting lymph nodes related to respiratory tract, being especially interesting the mediastinal lymph nodes. Both the carcasses and the viscera of animals regarded as positive are destroyed. In the present work, the method for assessment of tuberculosis compatible lesions is evaluated in order to define if it is really effective on several populations of red deer and wild boar located in areas with a history of high prevalence of tuberculosis. The presence of macroscopic lesions (VLTB) in 398 red deer and 1325 wild boar hunted in Western Spain was analyzed and then the presence of mycobacteria belonging to M. tuberculosis complex was assessed by culture in selective media and molecular identification. Results showed that in red deer, macroscopic prevalence was 9.4% whereas prevalence after culture was 11.8%. All animals harboring lesions gave positive results to culture without exception, highly confirming the validity of the method. In the case of wild boar, macroscopic prevalence was 47.3% whereas 59.9% resulted positive by culture, that is a notably higher value. These results show that macroscopic analysis in red deer and wild boar are a valid tool to assess the prevalence of tuberculosis in these game species in areas where the disease is present.

P.TL.30

Estimation of hunting-pressure on subadult wild boar by capture-recapture methodology in a Mediterranean area

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KEYWORDS : capture-recapture ; wildboar

In Mediterranean areas of Western Spain, a main part of game activity is based on wild boar hunting, which is practiced in wide estates by the traditional hunting system called monteria. This method consists in moving the wild boar from their resting places and direct them with the help of especially trained dogs towards the places where hunters are awaiting them. One of the features of this system is that each of the game areas can be hunted once a year, and these areas must be at least 500 Ha wide. Although this hunting system is the most practiced in the south and west of Spain, few references exist about its impact on the hunted populations, thus being difficult to make population estimates through the analysis of hunting statistics. The aim of this work is to quantify the impact of the monteria on a particular wild boar population sector that is key for the population dynamics as are subadults, in a closed estate which is representative of the kind of properties where monteria is practiced. The work was carried out in a estate located in Central-Western Spain with a surface of 1000 Ha, being the most of it covered by a well preserved holm oak forest. During august 2012, 5 traps with selective entrances were distributed by the estate to capture wild boar younger that one year, with a yield of 46 piglets, 17 being males and 29 females. Each piglet was marked with a microchip in the base of the ear and sampled for sanitary checking. Once finished the data and samples collection each piglet was released and its survival was subsequently assessed by the estate guards. In november, during the only monteria held in the estate, all animals hunted younger than one year were analyzed. A total of 41 animals younger than this age were hunted, from which only 13 were marked animals, which means that 31.7% of the 41 animals were recaptured, that is, the initial population should be 145 individuals. The sex distribution showed that from 17 marked males, 9 (52.9%) were hunted, and from the 29 females only 4 were hunted (13.8%). These data provide useful information to assess the impact of the monteria in this sector of population pointing to a greater vulnerability of young males, probably as a result of the abandon of the familiar groups when they are one year old.

P.TL.31

Methodical approach of rumen analysis to assess the nutritional energy of roe deer diet

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KEYWORDS : Capreolus capreolus ; diet ; method ; nutritional energy

The roe deer (*Capreolus capreolus*) is one of the most widespread wild ruminants in Europe. Its original habitats are mainly forests, forest clearings and forest outskirts. Fragmented forests in agricultural lands not only offers roe deers more habitats, but also a modified dietary spectrum. In this study we assessed the energy content and quality of the roe deer's diet in different seasons and in different landscape types.. To detect differences between different habitat types, agricultural land and forest area have been chosen.
The rumen content of roe deer was analysed by three standard procedures : Weender method, Van Soest- method and Hohenheimerfutterwerttest. Firstly a rument content analysis is carried out with food components distinguished as grass, herbs, shrubs, conifers, dwarf shrubs, mushrooms and 'others'. Using the Weender-method the nutrient status of the rument content can be assessed in terms of crude nutrients like crude protein, crude fat, crude ash, crude fiber and nitrogen-free extract. According to the Van-Soest method the crude fiber can be analysed more closely for cellulose, hemicellulose and lignin. To detect the energetical feed value of each rument content, the Hohenheimer Futterwert test was conducted. For a precise detection of the volatile fatty acids (SCFA) in the rument fluid, gas chromatography was used. Amounts of ammonia and lactate in the rumen fluids were measured by using a photometer. The sum of this applied analysis lead to a display of seasonal energy contents and seasonal qualities of roe deer diets in two different habitats.

P.TL.32

Evaluation of winter food quality of large herbivores using near infrared reflectance spectroscopy

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KEYWORDS : deer ; faecal neutral detergent fiber ; faecal nitrogen ; near infrared reflectance spectroscopy

Food quality is among the main factors determining condition, survival, and reproductive success of free-ranging herbivores, as well as one of the main driving forces governing their habitat use and distribution in space and time. Winter is generally considered as the critical period for free-ranging herbivores in terms of food quality and its availability. Therefore, detailed information on the quality of food consumed by free-ranging herbivores during winter seasons is essential for evaluation of possible effects of different management practices (i.e. such as supplemental feeding programs) and for designing effective management measures for these animals. This study evaluated data on winter diet quality of red deer (*Cervus elaphus*) and sika deer (*Cervus nippon nippon*) using faecal indices of diet quality (i.e. faecal nitrogen, faecal neutral detergent fiber). Samples of faeces were collected in three different areas throughout Czech Republic from January to March 2013 and analyzed with near infrared reflectance spectroscopy for concentrations of nitrogen and neutral detergent fiber. Spatial and temporal variation in food quality for red deer and sika deer as well as effects of different supplemental feeding programs between individual study areas on nutritional status of study animals were evaluated. The results and their implications will be presented at the conference.

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P.TL.33

Baltic seals - balancing between sustainable ecosystem management and fisheries (ECOSEAL)

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The population numbers of Baltic seals have recently increased. Along with the growing seal populations, seal induced damages to fisheries, i.e. both fish catch loss and damage to the gear, have increased which has caused a conflict between seals and coastal fisheries. Additionally, seals are suspected to have a crucial impact on the populations of economically important fish species. To decrease the seal damages, additional seal hunting licenses have been granted. On the other hand, unknown number of seals dies annually as by-catch of fisheries. Hence, the management of the Baltic seal populations is nowadays largely balancing between achievement of a favourable conservation status and acceptable level of losses to the coastal fishery. In the international ECOSEAL project we study and analyse the spatial and temporal variability in the diet of grey seals (Halichoerus grypus) based on samples from hunted and by-caught seals in the Central Baltic area using several methods (analyses of digestive tract hard part and DNA remains, muscle and liver stable isotopes and blubber fatty acids). The aim of the project is to produce a bioenergetic model of the ecological role of grey seals in the Baltic sea, and to gather information on the demographic structure of hunted and by-caught seals, which will be used further in a mathematical risk analysis model on the management decisions concerning Baltic seal populations, and to develop solutions and tools to diminish the conflict between seals and fisheries.

P.TL.34

Analysing the first 15 years of game bag records for Flanders, northern Belgium

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KEYWORDS : game management ; game species ; harvest data ; hunting statistics

Analysing harvest data is an old and common tool in wildlife management and research. Apart from being a possible proxy for population counts, harvest data play a key role in the sustainable management of game species since they provide information on an important source of mortality and allow assessing the consequences of changing hunting regulations.
In Flanders (northern-Belgium), an obligatory reporting scheme of annual bag records for Game Management Units (GMUs) was implemented in 1998. Game species considered in the reporting scheme include ungulates, lagomorphs, carnivores and game birds. We assessed the temporal changes in these bag records and their variance during the first 15 years of this monitoring scheme (1998-2012). Decision makers in the field of wildlife management in Flanders can rely on this assessment of the information available from the game bags in order to evaluate and adapt their management policy.

P.TL.35

Habitat evaluation of biomarkers (carnivores) in riparian vegetation and tropical deciduous forest of Mexico

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KEYWORDS : carnivores ; diet ; habitat ; wildlife

Carnivores are a group threatened by human activity, mainly by habitat reduction, logging, pollution of rivers, lakes and poaching. The landscape changes have caused extinction of species, imbalance in the food chain and within ecosystems. Carnivores are a key group in the regulation of vertebrates and arthropods, are good seed dispersers, being a key link in the ecosystem. The aim of this study was to assess the role of different species in a semi-disturbed system, through diet analysis. This work was made with the carnivores community of Molcaxac municipality, Puebla, Mexico. Samples were made monthly and seasonly (dry and wet) from June 2007 to May 2008. Feces were collected in a transect (2.5 km) in the Atoyac River and tropical deciduous forest. The excreta were measured and were identified, and then disintegrated to separate components. We analyzed 288 excreta from five species, the most representative were : coyote (76), gray fox (165) and ringtail (47). The main food of the coyote were mammals (92.13%) followed by plant materials (64.04%) and arthropods (48.33%). In the case of the gray fox consume more plant material (84.85%) while reptiles (12.26%) were the least consumed. Finally, the ringtail consumed mainly mammals (74.67%), and secondly reptiles (14.58%). Arthropods were important for all species, and sometimes exceeding 30% of monthly occurrence frequency. In conclucion carnivores such as coyote, gray fox and ringtail in Molcaxac are generalists because their diet is varied (annually and seasonally). Additionally, disturbance has been provide changes in ringtail diet, this species feed mainly on seeds in undisturbed deciduous forests.

P.TL.36

Small-scale landscape zoning in wolf management to reduce human-wildlife conflicts

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KEYWORDS : GIS ; hunting ; large carnivores ; livestock depredation

Estonian wolf population has grown from 16 to 31 reproductive packs in recent years (2006-2011) and it has a wide distribution throughout the country. This recent growth has been accompanied by increased number of livestock (mainly sheep) killed by wolves each year (from 149 in 2007 to 812 in 2012) which in addition to financial losses forms a major concern in wolf conservation. The level of conflicts can influence the public opinion about wolves with unfavorable public opinion usually incurring pressure to managers to increase the official quota and also higher levels of poaching. Estonian wolf population is subject to legal hunting (with annual quota ranging from 40 to 156 individuals) which if carefully planned can be a tool to decrease livestock depredation. Lowering wolf density by higher hunting pressure in conflict areas can help to prevent depredation while decreasing hunting in areas where wolves cause less problems (prey mainly on wild prey) helps to preserve the number and natural structure of these packs and so also overall population viability. We claim that with current management practice where county level (with altogether 15 counties in Estonia with mean area 2884 km^2) is being the smallest and only spatial scale for dividing the overall quota, the conditions are not met for neither of these objectives. One solution would be to take into account the amount and placement of suitable habitat for wolves as well as wolf density and level of depredation and divide landscape into zones with different management regime. To achieve this objective we carried out a GIS analyze to divide landscape into zones with three different wolf hunting regimes. Firstly areas where hunting pressure should be high (due to high amount of depredation), secondly where hunting pressure can be medium and thirdly areas which due to high wolf density but low level of depredation can be without wolf hunting and left as wolf 'refugee areas'. For analysis we used data about wolf density, hunting and spatial distribution of killed livestock in Estonia from years 2006-2012. We found that although livestock depredation events can be found in almost every part of wolf range, in many cases the areas with high level of depredation can be well defined. Although the area suitable for creating wolf refugee areas was not evenly distributed, the overall locations of these areas allow creating areas that would fit the home range of one or two wolf packs in several parts of Estonia. The map of zones with different level of hunting pressure produced in this study should be used in future work when creating wolf management units that are different from counties used so far.

P.TL.37

Long-term density estimate of roe deer (Capreolus capreolus) in deciduous woods using distance sampling

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KEYWORDS : data truncation ; detectability ; line transect ; thermal imaging

To conserve and manage wildlife effectively it is necessary to know about population trends and density estimates. Due to lack of detailed data population trends are mostly based on hunting statistics; this is not adequate enough. A standardized application in research is required to get reliable estimates.
Distance Sampling is a well-known and widely used method to evaluate wildlife populations. Here we present our findings from a line transect survey in Lower Saxony (Germany). In a long-term study from 2003 to 2010 we investigated roe deer densities in forest habitats. In this poster we present the results of one of our study areas, 'Hohnstedter Holz'. The central research area amounts about 270ha and presents a hunting territory consisting of deciduous woods. The area is dominated by red oak (*Quercus borealis* & *Quercus robur,* 36%) and european beech (*Fagus sylvatica*, 17%); the rest of the forest consist of planted pine (*Pinus sylvestris* 12%), spruce (*Picea abies*, 12%) and other deciduous trees. During October 2003 to January 2010 we carried out over 40 nocturnal transects with an infra-red camera and recorded over 650 detections of roe deer. The density per 100 ha calculated with Distance 6.0 (Thomas et al. 2010) varies over the years. A snaphot of only one year would not be representative for the population. For that reason it is recommendable to have a closer look on the general tendancy.

It is clear from our results that open forests are most suitable for this kind of census. In dense forests the detectability seems to be markedly lower, resulting in additional expenditure to get enough data for accurate interpretation. Evasive movement in response to human activity and avoidance of roads affects the accuracy of estimates carried out from the road; yet this may offer the only realistic opportunity for recording deer at night . In practice the influence to the roe deer appeared to be not as strong as to other wildlife. Most of the detected roe deer individuals showed none or no more than slight reactions to the observer, unless they were right beside the road.
Approximately 90% of the deer were at least over 20m away from the road. We show how data truncation may improve the results and outline the difficulties. To improve the results, we suggest that future studies also regard the vegetation structure in order to use different covariates.

Thomas, L., S.T. Buckland, E.A. Rexstad, J. L. Laake, S. Strindberg, S. L. Hedley, J. R.B. Bishop, T. A. Marques, and K. P. Burnham. 2010. Distance software : design and analysis of distance sampling surveys for estimating population size. Journal of Applied Ecology 47: 5-14. DOI: 10.1111/j.1365-2664.2009.01737.x

P.TL.38

The radio-collared animal as a moving weather station?

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KEYWORDS : ambient temperature ; GPS collar ; model ; temperature logger

Data of extra-corporal temperature sensors are influenced by the radiation of the sun and the heat of the animal´s body. In the poster, we want to explain the model that determines the ambient temperature from the temperature data measured by a GPS collar on a free-running animal.
Study animals were free-ranging roe deer (*Capreolus capreolus*) in Brandenburg (Germany) collared with GPS-VECTRONIC devices. Additionally to the GPS-positions, these collars record the temperature in a two-minutes interval. The weather data of the study area (temperature, wind, rainfall, air pressure) were recorded by two weather stations : One station was placed at a sunny location, the second station was placed in constant shadow. Furthermore, we also used data of the public weather stations available to everyone.
We used all parallel recorded temperature data in a model to find a factor that make it possible to automatically infer (within a certain range) the immediate ambient temperature using only the temperature data recorded by the GPS-collar. These continuous information about ambient temperature of the animal can be related to the spatial position of the animal and give new opportunity to answer questions that connect temporal-spatial behaviour of wildlife with climate.

Abstracts
Posters

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P.WH.01

Onset of Woodpigeon Columba palumbus breeding season in Flanders as based on gonadal development

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KEYWORDS : bird management ; bird reproduction ; breeding season ; gonadal development

In Flanders, woodpigeon bag sizes and population estimates increase annually, along with the crop damage they cause. This raises the demand for a more efficient woodpigeon population control. In Flanders, the woodpigeon hunting season starts in September and ends in February. Outside of this period, woodpigeon shooting is restricted to local damage management. Since during winter, the population is enriched with migratory birds, management of the breeding population would benefit from an extension of the hunting season beyond this period. In Europe, however, bird hunting is not allowed during the breeding period, as determined under the European Birds Directive. This directive states that, for woodpigeon, the breeding season starts with nest building and ends with the fledging of the juvenile birds. To date, this breeding season in Flanders is believed to last from March to September but recent surveys indicate otherwise. Here, we aimed to determine the onset of the breeding season by examining gonads from adult birds. A study area that comprised hunting grounds in both open farmland and woodland was selected to maximize variation. A total of 185 adult pigeons was collected in six different weeks from mid-February to May. Weight of the largest testis and diameter of the largest follicle were measured and analysed with generalised lineair models to determine the influence of both region and sample week. Results showed that in both regions male pigeons gradually became sexually active throughout March while female woodpigeons only became sexually active around the end of March/beginning of April. Since only from this point on, both male and female gonads reached a state of sexual activity, the period of courtship and nest building is situated around early April. This implicates that hunting in March would not interfere with the woodpigeon breeding season in Flanders.

P.WH.02

The study of immunity of raccoon dogs and their litter after antirabies oral vaccination

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KEYWORDS : colostral immunity ; rabies ; VNA

The raccoon dog is one of the main rabies reservoirs in the wildlife. In the regions of tense epizootic rabies situation, OIE recommends to carry out an additional oral vaccination campaign of wild animals with the aim of immunization of growing young animals. The leading role in the protection of newborns from infectious diseases belongs to the passive maternal immunity, the mediators of which are mostly antibodies supplied with colostrum and maternal milk.

It is known that presence of colostrum antibodies adversely affects the development of postvaccinal immunity because of their ability to suppress vaccinal immunity especially when live vaccines are used. In view of this, it is recommended to optimize the time period of the third oral vaccination campaign that is carried out when the level of rabies incidence is high.

Female raccoon dogs were orally immunized with “Sinrab” virus vaccine that contained a fixed rabies virus strain «PB-97» reproduced in BHK-21 suspension cell culture with titer of infectious activity 6,5 lg TCID50/cm^3. The virus containing material had been filled per 2cm^3 into small plastic containers frozen at minus 200°C. Afterwards, the containers were put into attractive rectangular baits weighting 25-30g. The baits with virus vaccines were kept at minus 20°C till their use. Before use, they had been defrosted for 24 hours at 10°C and then fed to the raccoon dogs.

The whelping period of the female animals fell on April – May of 2012. During 6 months after birth, the cubs had been taken blood samples for humoral immunity level study. The antibody level was determined in the reaction of neutralization by FAVN. The number of cubs in the litters was from 10 to 14 animals. The cubs had been with their mothers for 35-40 days.

Within the period of 6 months (the observation period), after one use, «Sinrab» virus vaccine induced formation of antirabic virus neutralizing antibodies in female raccoon dogs up to the level necessary for the animal protection (0,5 ME/cm^3) The colostral immunity of newborn cubs had been preserved for 4 months. The highest value of antibody titers had been observed by the 60th day of cubs’ life. As the result of the carried out studies it was established that the used vaccine did not cause adverse effects in breeding, was harmless to animals and has formed tense immunity in adult animals and their litter. Given the data recommended to the vaccination of young animals in September.

P.WH.03

Evolution and impact of different parameters on badger damage to maize fields in Wallonia

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KEYWORDS : injuries ; Meles meles ; Sus scrofa ; Zea mays

Agricultural damage due to protected species is refunded to farmers by the Walloon Region, provided that the species involved and the extent of damages are assessed by an expert. Although the badger population is stable in Wallonia, the amount of damages in maize fields has recently increased. Besides that, wild boars are expanding in numbers and they are also known to be maize eaters. Since it is a game species, the hunters have to pay for the damage it causes. The aims of the study were :

- to study the evolution of badger and wild boar damages during the maize season in a sample of plots around Dinant and Marche;
- to compare damage estimation protocols used by several experts in order to propose a standardized and reliable method of assessment;
- to study the influence of different variables on the importance of damages : distance to the nearest badger den, type of vegetation cover around maize fields, distance to the closest forest edge…

For this purpose, 30 maize parcels were selected according to their proximity to a badger sett or because they formerly underwent damage compensation related to badgers. Badger and wild boar damages were evaluated four times from August to October, at intervals of more or less 10 days. For each site, the nearest badger den was located, distance to forest edge was measured and the vegetation structure was noted within 150 meters around the parcel. Our damage estimates were compared to those evaluated by the experts. The phenology of damage varied between parcels. However, significant differences were observed between our damage estimates and those of the experts. The disparity of among the methods employed partly explains this variability, each of them involving some sources of error. Therefore, a standardized method has been developed, in order to reduce this variability. It seems to be more reliable and should bring a decrease in the total amount of financial compensations refunded for badger damages, because of a reduced risk of overestimation.

P.WH.04

Damages in young Scots pine (Pinus sylvestris) stands : Who is to blame?

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KEYWORDS : moose ; red deer ; roe deer ;

Estonia is inhabited by three cervid species - moose, roe deer and, on islands and in the southern part of mainland Estonia, red deer - all of which can potentially use Scots pine as a food source during winter. The aim of this study was to determine the contribution of each species to damage caused to young pine stands. Of special interest was the role of red deer, a newcomer in Estonian fauna, in causing forest damage. Studies in Western and Central Europe have shown high relative importance of Scots pine in red deer diet, which has also alarmed Estonian forest owners.
60 young pine plantations, accessible to all three cervid species (0.5-1.5 m high), were studied in three different regions of Estonia. The number and proportion of young pines with fresh browsing traces was estimated at each site in spring. Simultaneously, the winter pellet group density of moose, roe deer and red deer was determined at studied sites and also in the surrounding area. The mean percentage of young pine trees browsed by cervids was 22.3% over all areas. The browsing damage in Southern Estonia was considerably lower than in the islands of Saaremaa ($p=0.002$) and Hiiumaa ($p<0.001$). A significant positive correlation was established only between the browsing ratio and density of moose pellet groups. Moose (pellets) density was significantly higher ($p=0.027$) in the young stands than in the surrounding areas. The density of red deer and roe deer (pellets) in the young pine stands and in the surrounding area (mature forest) did not differ significantly. Moreover, the density of roe deer in the surrounding area (mature forest) tended to be higher than in young pine stands.
The results of the study allow us to conclude that the bulk of the damage in young pine stands is caused by moose. The role of red deer in causing damage is significantly smaller and that of roe deer (at least in snowy winters) insignificant. This conclusion is indirectly supported by earlier studies which indicated that the proportion of pine shoots in the rumen contents of red deer shot during open season, i.e. from September to the end of January, is marginal. Why are red deer in Estonia less interested in pine as a source of food than the same species elsewhere, requires further investigation.

P.WH.05

Fine-scale analysis of wildlife-vehicle collisions in Southern Belgium

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KEYWORDS : human safety ; mitigation ; road ecology ; wildlife management

Wildlife-vehicle collisions (WVC) have become an increasing phenomenon in many European countries. These road accidents are a threat to wildlife population but also to human safety and generate high economic costs. The Wallonia, Southern part of Belgium, is also affected by the WVC problem and offers an interesting study area because of its very dense road network and the increase in its big game populations.
In a first analysis, based on collision data recorded by the police, species involved and spatio-temporal distribution of WVC has been made (Morelle et al., in review). Focusing now on a smaller area and completing the data recorded with others sources (insurance companies), we studied local landscape variables, species density and road-related variables around hotspots that might influence occurrence of these accidents.
Landscape variables were extracting from land cover map available for Wallonia. For estimation of species density we used available data on the annual harvest and data on crop damages. Road-related variables comprised traffic volume, number of traffic lanes, the speed limit, the topography and the presence of a ditch, bridges, central reservations, fences, guardrails and road lightings. Moreover the visibility for drivers could play a role in the frequency of WVC and will be assessed by taking into account the undulation and the sinuosity of roads.
Finally the variables related to the frequency of WVC could be used in models to predict the risk of collisions along the road network of Wallonia. With these results, the priority areas could be identified and improvement of the road network could be proposed in order to successfully limit the ecological, social and economic costs of the WVC problem.
Morelle K., Lehaire F., Lejeune P. (submitted, in review). Spatio-temporal patterns of accidents involving animals in the densest road network region.

P.WH.06

Wild Boar Berlin - Ecology of Wild Boar (Sus scrofa) in Urban Environments

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KEYWORDS : adaptation of wildlife ; human-wildlife conflict ; urban ecology ; wildlife management

The worldwide growth of urban areas displaces habitats for wildlife and an increasing number of wildlife species, including large mammals, establish populations in large cities. Berlin is famous for wild boar occurrence which causes conflicts with the public. This forces responsible authorities as the forestry department to develop effective management strategies which prevent further conflicts. However, this task is often complicated due to the lack of scientific data about the ecology of wild boar within the city.
Therefore, we study the ecology of wild boars in Berlin which can also be used as a model for wild boars in other cities. We hypothesize that Berlin is an attractive area which might serve as a source rather than an attractive sink. To test this we capture animals from different parts of Berlin city as well as from the periphery and the surrounding countryside and use telemetry for detecting temporal and spatial movement patterns. Activity sensors allow us to detect the behavior in different areas and are therefore a useful tool for characterizing habitats. Another approach is to collect samples from hunted animals and analyze stress levels, body condition, health and reproductive status and food sources. Tests for correlations of these different factors will allow us to get a broad understanding of wild boar urbanization strategies.
The project will provide a comprehensive understanding of the flexibility of life-history strategies and adaptation of wild boar to urban areas. Our results will be provided to authorities to support the development of long term management plans and conflict solving strategies.
This talk will provide preliminary results of telemetry data and samples from hunted animals. As the project just started, we will also give a methodological overview about special issues of doing research in an urban environment.

P.WH.07

Schmallenberg virus circulation among red and roe deer populations in Belgium

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KEYWORDS : deer ; Schmallenberg virus ; serology

Schmallenberg virus (SBV) is a recently discovered vector-borne Orthobunyavirus targeting ruminants. It is transmitted by Culicoides biting midges and caused a large outbreak in European sheep and cattle populations in 2011 and 2012. The infection of adults was associated with a drop in milk production, fever and diarrhea. But the virus was further shown to cross the placental barrier and to be responsible for a hydrocephaly/arthrogryposis syndrome in calves and lambs. After its occurrence in 2011 in Germany, SBV quickly spread across Europe and in spring 2012 more than 90% of Belgian domestic cattle had seroconverted. To assess the susceptibility of wild ruminants to the infection, a total number of 547 and 494 sera, from red (*Cervus elaphus*) and roe deer (*Capreolus capreolus*), respectively, were collected during the hunting seasons 2010 to 2012 and tested for the presence of anti-SBV antibodies. While no samples from 2010 revealed to be positive, about two-thirds of red deer and half of roe deer sampled in 2011 were seropositive. In 2012, the seroprevalence dropped to 33% in red deer and remained stable in roe deer. The high seroprevalence rates found in both species in Belgium shows that wild ruminants are susceptible to the infection by SBV. If the infection of deer was associated to a hydrocephaly/arthrogryposis syndrome similar to that observed in domestic ruminants is still unknown. There are currently no evidence of such a transplacental passage in red or roe deer. The decrease in the seroprevalence observed in red deer in 2012 might be the result of the turn-over in the red deer population and reflect an absence of virus circulation in 2012. Further investigations in the upcoming years will help to enlighten this point.

P.WH.08

Outbreak of tularemia in Hare and tick-born infection risk for human

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KEYWORDS : Francisella tularensis ; Ixodes ricinus ; Lepus europaeus ; zoonosis

Tularemia is a cosmopolitan bacterial zoonosis caused by Francisella tularensis. Because of its pathogenic potential, tularemia is a notifiable bacterial zoonosis in France, and is listed as potential bioterrorist weapon. This bacterium can be found in many animals. In France, the European brown hare (*Lepus europaeus*) plays an important role in the ecology of tularemia, and may serve as a significant source of human infection. About 80 human cases of tularemia are reported each year to the French Institute for Public Health Surveillance (Institut de veille sanitaire, InVS). In Hare, tularemia is usually sporadic with 100 to 150 cases reported each year in the whole France thanks to the SAGIR national network (outbreak-based surveillance network of wildlife diseases).. In France, ticks are suspected to be responsible for 10 to 15% of the human cases. Regarding hares transmission pathway, the main way described in literature is vectorial, with a special mention of the role of ticks. From January to March 2011 an outbreak of tularemia characterized by a high mortality rate in the local brown hares population was reported in Pas-de-Calais (North of France). Although in France, hare tularemia is usually sporadic and does not significantly affect hare populations, here 51 individuals were found dead of tularemia in a small wood in Habarcq (110 ha) and its surrounding. The origin of the contamination in hares was not clearly established, although the presence of *F. tularensis* was detected by real time PCR in 2 ticks collected from dead hares in the epicenter of the outbreak. In March 2012, during a milder spell of weather, another outbreak was described in the same wood, involving 10 hares. The epizootic form of the outbreak reported here and the potential vectorial reservoir led us to reconsider the potential associated risks for public health as the Habarcq wood is highly frequented.
The objective of the present study was to assess the risk of vectorial transmission for hunters, foresters, wildlife professionals or walkers and steer its prevention and gather information on the local epidemiological cycle. Thus we studied the species and densities of questing ticks that could be a possible route of dissemination of *F. tularensis* among hares in the wood and searched to characterize the prevalence of F. tularensis in ticks (real time PCR) and to study the genetic profile of the bacteria strains (genotyping by using MLVA and genome sequencing). The results of the 2 tick collections, in June and September 2012, show relatively low ticks densities : 7.5 and 6 questing ticks (adults and nymphs)/100m², respectively. All the ticks belonged to the *Ixodes ricinus* species and none was infected by *F. tularensis*. Sequencing of whole genome of strains isolated from dead hares and from tick collected on dead hares is still on-going. The first results of the study suggest a low tick-born infection risk for human. Further studies are planned, including histology on dead hares and surveillance of rodents, to gain knowledge on the transmission route and on the maintenance of a disease in the area.

IUGB 2013

P.WH.09

Biological background data are needed in assessment of disease spread in the Wild Boar

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KEYWORDS : disease transmission ; mangement ; wild boar

In recent decades, a dramatic increase in wild boar densities has been reported from throughout Europe. In Germany alone, hunting records suggest that the species has increased 25-fold since the 1930s. Related to this general increase in abundances, wild boars have recently started to colonise urban areas. In Berlin in particular they have become a permanent member of urban biocoenosis. Over the past five years, an average of about 9 animals•km^{-2} (hunting area) wereharvested in Berlin. In comparison, only 2.5 animals•km^{-2} (hunting area) wereshot over the same period in the adjoining federal state of Brandenburg. Notwithstanding some high densities in certain regions of Brandenburg, these data suggest that the density of wild boar in the city is higher than in the adjoining rural area.
The wild boar population in Berlin is of particular concern from an epidemiological point of view, as the urban environment provides ample possibilities for disease transmission e.g. from contacts with human leftovers. While swill feeding is strictly forbidden for domestic pigs a scenario could be the emergence of African Swine Fever (ASF) through illegally imported meatproducts. Once established disease spread could be particularly rapid in high-density-populations. Therefore, monitoring prevention and control of infections in wild boar is of great importance, not only because their negative impact on the health of wild boar populations, but also because of the possible threat to domestic pig populations.
For example, Aujeszky's disease (AD) a notifiable viral disease of pigs is present in the urban boar population. Between 2000 and 2006, the seroprevalence was 4.7% on average. In comparison, between 7 and 29.5% of animals from the state of Brandenburg tested serologically positive in the period from 2004 to 2008 (Pannwitz et al. 2012). While prevalence can reach up to 40% regionally the transmission to domestic pigs is an unlikely event (Mueller et al. 2011). Classical swine fever virus (CSFV) another notifiable pig disease for which the wild boar represents the reservoir, has not been found in Berlin or Brandenburg.
In order to understand the risk of disease spread and develop effective management strategies, it is important to have a sound understanding of the biology and ecology of urban wild boars. In this context, it is important to understand space use patterns. Both classical telemetry tools (to analyse contact rates, home range sizes, densities, etc.) as well as genetic methods (to investigate dispersal behaviour, population genetic structure, etc.) can provide important basic ecological background data that are required to develop adequate epidemiological models. Given the high wild boar densities in urban areas, itis important that epidemiologists, veterinarians and ecologists collaborate in order to better understand the risks and potential problems of disease spread in Berlin wild boar.

P.WH.10

Impact of Wolf on livestock in Northern Italy and prediction of predation risk

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KEYWORDS : Canis lupus ; husbandry ; Northern Apennines ; predictive model

Mortality due to illegal killing by humans is still today one of the main risk factors for the wolf (Canis lupus) and the effective management of conflict between wolves and livestock breeding is a great concern for species conservation. We assessed the impact of wolf on livestock in an area of Northern Apennines analyzing data provided by the Provincial Administration of Piacenza and additional data directly collected through interviews to farmers during the period 2005-2012. We recorded : i) the number of farms that have suffered predation (classified by : livestock species, productive orientation, rearing method, level of surveillance and preventive methods), ii) the number of predation events and the number of preyed animals. The effects of management factors were evaluated by Likelihood Ratio (exact test with permutation) as regard the frequencies of predation and by Multifactorial Analysis of Variance as regard the average number of heads preyed upon for each event of predation. By Regression and Curve-fit Analyses we evaluated the relationships between the number of predation events and of the number of animals preyed and 21 variables characterizing the grazing areas. Then we formulated a predictive model of the predation probability, through a forward stepwise Binary Logistic Regression Analysis with pasture characteristics as predictors. Livestock species, productive orientation, rearing and preventive methods resulted the most important factors affecting the frequency of predation events and the number of preyed animals. The average number of preyed heads per event increased during the study period and was greater for sheep than other species. The number of predation events showed significant relationship with the pasture slope, the percentage of mixed deciduous forest, the percentage of total deciduous forest and the distance from villages. The number of preyed animals was significantly related with the pasture exposure and with the percentage of mixed deciduous forests. In the model of predation risk entered the rearing methods, the shape index and the percentage of coniferous forest cover, both with a negative effect on the predation probability, whereas exposure had a positive effect. 33.3% of the pastures resulted at low predation risk (Probability of predation = 0.0 - 0.3), 4.2% at medium predation risk (Probability of predation = 0.3 - 0.6), and 62.5% at high predation risk (Probability of predation > 0.6). Overall, 64.6% of the pastures were potentially at risk of predation (Probability of predation > 0.5).

P.WH.11

Spatial analysis of bark-stripping damage by red deer in irregular hardwood forest

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KEYWORDS : environmental variables ; management forest ; temperate deciduous forest ; ungulate damage

It is undeniable that bark-stripping damages depreciate timber quality. These damages are not only linked to the density of red deer but also to the environmental characteristics of their habitat. These environmental variables must be taken into consideration for a complete and valuable spatial analysis of bark-stripping. The bark-stripping damages in coniferous stands are well-known due to the fact that they are relatively frequent. No such information is however available for deciduous stands.
To fill this gap, we used data of inventory campaign that were carried out for management purposes in Ardenne (in southern Belgium). In each sampling unit (total of 341 units), we measured different stand characteristics and, during a second phase, the bark-stripping damages. These latter measures concerned the presence or absence of bark-stripping on each recorded stem, damage age (presence or not of a healing roll), height, as well as the percentage of the circumference and the species bark-stripped.
The main objective of this presentation is to analyse the presence of bark-stripping in relation with environmental variables of the areas where bark-stripping is observed. In particular, the potential explanatory variables are the slope, the exposition and habitat spatial structure which is, in particular, characterized by the distances to the natural or artificial feeding points, to watering-place, to the different types of road and to the forest paths, to refuge areas for deer and to forest edges. We additionally analyse the probability of bark-stripping in relation to the distance to the nearest bark-stripped tree. Indeed, it is noteworthy that when a tree is bark-stripped, its closest neighbour has a higher probability to suffer from similar damages than other more distant trees.
This work provides valuable information for the management of the studied forest. Indeed, depending on forest structure, we attempted to identify acceptable levels of bark-stripping damages. For example, in stands with abundant natural regeneration, higher bark-stripping rate can be considered as acceptable in comparison to forest where the regeneration is poor or inexistent.

P.WH.12

Factors affecting predation on livestock by wolves in Liguria, N-Italy

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KEYWORDS : Canis lupus ; damage trend ; livestock vulnerability ; risk model

Despite of the recent wolf recovery in many European countries, the main threat to wolf conservation seems to be the conflict with livestock farmers which leads to continuous episodes of illegal killing. Thus wolf conservation efforts can prove insufficient when the predator has a negative impact on the economy of local communities. In this perspective, knowledge of mechanism regulating the livestock-wolf relationship is a prerequisite for the wolf conservation success. This research was performed at regional scale on the Liguria region (5420 km^2) and it is a part of the project 'The Wolf in Liguria' that has been promoted and supported by the Regione Liguria Administration. We collected and analysed the livestock predation events (number of attacks, number of losses and location of kill sites) and compensation cost to quantify the predation impact for the period 2007- 2011. Regional livestock availability was obtained from census database of stockbreeder associations. The numbers of sheep and goats, and cattle given by stockbreeder associations were considered and confirmed by field counting during the grazing period. Moreover, data on environmental features of the grazing areas (location, size, grazing period), husbandry, and protection methods adopted by the shepherds were also investigated. To assess significant differences in the average size of farms in the provinces, we used GLM with the factors year, province and species. Likelihood ratio with permutation was used to verify the differences in frequency of predation among provinces, livestock species, production guidance, rearing method and level of surveillance. We also carried out regression and curve-fit analyses, to detect significant trends of the event occurrence, the number of preyed animals per event and the amount of refunds. To detect the differences between the characteristics of pastures with predation events and those without we measured 21 variables of pastures used by free-grazing livestock and checked for significance by Mann-Whitney U test. To individuate the factors affecting the probability of predation we carried out Logistic Regression Analyses and selected the best models by AICc method and Multi-model inference. The average size of the livestock breeding was significantly different among provinces ($F=27.63$; $df=3$; $P<0.0001$) but among livestock species ($F=0.16$; $df=1$, $P=0.693$), interaction between the two factors was not significant ($F=0.04$, $df=3$, $P=0.991$). Cattle-breeding without calves were significantly less susceptible to predation than sheep and goats breeding and cattle-breeding with calves ($X2=2.83$; $df=1$; $P<0.041$ and $X2=4.31$; $df=1$; $P<0.031$ respectively) while the difference between cattle-breeding with calves and sheep and goats breeding was not significant ($X2=0.45$; $df=1$; $P=0.576$). Curve-fit analyses showed an increasing trend of the of number of attacks and killed heads ($F=101.76$; $df=1$; $P<0.0001$; $R2=0.927$ and $F=34.47$; $df=1$; $P<0.0001$; $R2=0.812$ respectively) while a decreasing trend resulted for refunds ($F=10.67$; $df=2$; $P=0.007$; $R2=0.753$). Among the pasture variables only the percentage of mixed forest around pastures entered with significant coefficients in the 3 best models (?AICc<2). Our study allows individuating the types of livestock breeding that are at greatest risk of attack by wolves and the characteristics of pastures that can enhance the probability of predation events.

P.WH.13

Infection of mycobacterium avium paratuberculosis and mycobacterium avium hominissuis in a wild red deer

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KEYWORDS : cervids ; culture ; lymphadenitis ; mycobacteria

Paratuberculosis is a chronic enteritis of ruminants caused by Mycobacterium avium subsp. paratuberculosis (*Map*). Major lesions are mainly observed in the lower part of the small intestine and associated mesenteric lymph nodes. Mixed mycobacterial infections are reported in cervids but mostly in farmed deer. In this study, we report a mixed infection *Map / Mycobacterium avium subsp. hominissuis (Mah)* in a free-living red deer culled in fall 2011 for sanitary reasons (severe emaciation and diarrhoea). At necropsy, gross lesions were observed in the mesenteric lymph nodes, which were strongly enlarged, and the jejunum presenting encephaloid-like portions. Samples of feces, ileocaecal junction and mesenteric lymph nodes were proccessed for bacterioscopy, histopathology, *Map* PCR and culture. Microscopic changes were characterized by granulomatous enteritis and lymphadenitis, with abundant acid-fast bacilli in macrophages and giant cells (multibacillary form). The presence of *Map* was shown by targeted IS900 PCR performed on mesenteric lymph nodes, ileocaecal junction and fecal samples while bacterial cultures on these tissues demonstrated a mixed infection of *Map* with *Mah*. This environmental mycobacteria, commonly found in soil and water, is associated with opportunistic infections in humans. In conclusion, mixed mycobacterial infections are probably underdiagnosed in wild cervids but further investigations are needed to know if these mixed infections may result in more aggressive lesional picture in infected animals.

P.WH.14

Disease situation of red foxes (Berlin) - Importance for healthcare and influence on population dynamics

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KEYWORDS : distemper ; rabies ; sarcoptes mange ; small fox tape worm

We analysed aspects of the population ecology and the diseases situation of red foxes in Berlin. In total a number of 7.835 Foxes from Berlin was sent to the State Laboratory Berlin Brandenburg for annual rabies control (1988-2011). These data as well as data from breeding den register were used to analyze population dynamics and the impact of diseases. We focused on rabies, the small fox tapeworm, the sarcoptes mange and distemper. Due to his susceptibility to some significant diseases for human beings and domestic animals, red foxes should increasingly be taken into account as vector in urban space. After rabies does not occur anymore and due to the minor prevalence of the small fox tapeworm human beings are not endangered at the moment. However, it should be considered that red foxes transmit distemper and the sarcoptes mange on to domestic animals. Therefore prophylactic measures for dogs urgently need to be established. We also found out that some significant stock fluctuations appeared in terms of various diseases. The maximum annual prevalences were about 25% in sarcoptic mange, 32% in rabies and 51% in canine distemper. Thus, distemper was the most important disease of the past two decades. A consistent observation of red foxes as well as continuing studies are necessary because of the rising fox population.

P.WH.15

Magnetic alignment in wild boars (Sus scrofa)

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KEYWORDS : magnetoreception ; wild boar

Body orientation was measured in altogether 2,333 free living foraging or resting (beds) wild boars belonging to 399 groups, covering both sexes in all age classes. The measurements were conducted in different habitats (field, meadow, pasture, forest), in 23 localities in the Czech Republic, both in lowland and in mountains, in agricultural landscape as well as in pristine countryside, at different times of day (between 6:00 a.m. and 24:00 p.m.) year-round from 2008 to 2012. The wild boars preferred to align their bodies in NNE (and partly also SSW) direction (mean angular vector length 0.21; Rayleigh test: $p < 10\text{-}12$). Since all other environmental factors that might have affected body alignment (slope, wind direction, sun position) were either absent or stochastically randomly distributed over all directions, the most parsimonious explanation for the directional preference is the alignment along the geomagnetic field lines. The directional preferences were similar for all subgroups (sex, age classes, and activities). However, the preferences were more pronounced in the group of juveniles (compared to other age classes) as well as in foraging (compared to resting) individuals. The body orientation of wild boar showed significant deviations from random distribution in different habitats. There was no apparent effect of the season of the year on the preferred heading. The effect of the group size is of particular interest. Whereas single individuals showed a slightly significant preference for N-S axial body orientation, the common directional preference was less apparent in groups of 2 animals. The alignment was highly significant and strongly positively correlated with group size for groups containing three or more wild boars. This effect might be explained by an antipredatory strategy (necessity for guarding is more important than magnetic alignment) or in terms of the averaging 'many wrongs effect' (i.e. the animals in the group check their alignment with that of their neighbors and adapt and correct their own compass deviations). In this study we present strong, though indirect, evidence for magnetoreception in a further taxon of mammals, thus far unstudied from the aspect of magnetobiology. We discuss the role of magnetic alignment from different points of view (physiological relaxation, sensory concentration). The study was supported by the Grant Agency of the Czech Republic (Grant 506/11/2121)

P.WH.16

Aujeszky's disease virus seroprevalence in wild boar, Southern Belgium, 2012

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KEYWORDS : Sus scrofa ; swine ; Wallonia

Sus scrofa is a largely distributed wild species in Southern Belgium (Wallonia), with an estimated population of about 25 000 animals over 16 844 km². As wild boars share a variety of pathogens with farm animals, they theoretically constitute a source of contamination. This hypothesis requires close monitoring in situations where a given pathogen circulates in wild boar whereas the domestic pig population living in the same geographical area is free. This is officially the case in Belgium since October 2011, after the pig sector conducted a systematic vaccination campaign against Aujeszky's disease virus (ADV). Since January 2009, the vaccination is prohibited, which left the Belgian pig population seronegative, thus immunologically naive against ADV. To assess the risk posed by this situation, it is important to evaluate the fraction of the wild boar population that hosts the virus and could therefore reintroduce it.From October 2012 to January 2013, an active surveillance program was carried out throughout 4 of the 5 provinces of Wallonia with the help of hunters and hunting societies. Five hundred ninety-six blood samples were drawn on dry tubes from hunter-killed wild boars. The corresponding sera were screened for the presence of antibodies targeting the membrane glycoprotein-B of ADV using a competition ELISA. Descriptive characteristics of the cohort sampled are the following : 142 adults (> 2 yr old) of which 78 males and 66 females, 125 subadults (1-2 yr old) of which 55 males and 70 females, 252 juveniles (6-12 mo old) of which 107 males and 145 females and 70 piglets (< 6 mo old), of which 37 males and 33 females. Global seroprevalence was 18.3% (IC 95% : 15.2 - 21.4). There was no significant difference in seroprevalence between males and females or between the different months of sampling. The age of the boar had a significant effect, the apparent seroprevalence observed being higher in adults [40.3% (IC 95% : 32.3 - 48.3)] than in subadults [21.4% (IC 95%: 14.3 - 28.6)], juveniles [3.6% (IC 95% : 1.3 - 5.8)] and piglets [18.6% (IC 95% : 9.5 - 27.7)]. The location of sampling had a significant effect on the seroprevalence too. The apparent prevalences were higher in the provinces of Hainaut [30.8% (IC 95% : 13.0 - 48.5)], Namur [23.03% (IC 95%: 16.8 - 29.2)] and Luxemburg [18.7% (IC 95% : 14.1 - 23.4)] than in the province of Liege [7.5% (IC 95% : 2.8 - 12.2)].The results gathered here are consistent with an endemic circulation of ADV in the wild boar population living in Southern Belgium. The risk of reintroduction in the domestic pig population is therefore not negligible, especially where domestig pigs are raised outdoors. If a reintroduction happens in the future, confirmation or refutation of its 'wild' origin will rely on the comparison of genomic sequences. Therefore, isolation of a set of wild boar strains currently circulating in the region is a priority.

P.WH.17

Detection of Mycobacterium celatum in wild boars in Southern Belgium

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KEYWORDS : mycobacterium ; tuberculosis ; wild boar

Bovine tuberculosis (bTB) remains a major threat in livestock industry and presence of wildlife reservoirs of Mycobacterium bovis (*M.bovis*) is an obstacle to bTB eradication in domestic animals. In this context, surveillance of M.bovis in wildlife is strategic for the implementation of effective control measures. The aim of this study was to analyse wild boars lymph nodes for the presence of *Mycobacterium* spp. In field conditions, 230 hunter-killed wild boars were investigated in hunting areas spread over 4 provinces in Southern Belgium. Wild boars carcasses were subjected to a systematic post mortem analysis and submandibular lymph nodes were collected for bacteriologic examinations (Ziehl-Neelsen (ZN) staining, histopathological examination and classical mycobacterial culture). At necropsy, no boars presented gross lesions in thoracic and abdominal cavities (organs and associated lymph nodes). Out of the 230 submandibular lymph nodes, 49 (21 %) showed gross lesions. For 43 of them, abscesses of varying sizes were observed, sometimes multifocal, caseous or calcified. For 6 remaining samples, lymph nodes were enlarged and consolidated. Histologic examination showed a few multinucleated giant cells in 5 lymph nodes but no acid-fast bacilli were visible with ZN staining. All the mycobacterial cultures were negative for *M. bovis* but an atypical mycobacterium, *M. celatum*, was isolated from 4 wild boars isolates. This uncommon bacteria was also isolated in 2 cattle farms in the same region (M. Govaerts, personnal observation). *M. celatum* is a slow growing mycobacterium which is potentially pathogenic in humans. But the presence of this nontuberculous mycobacterium may be challenging in *M.bovis* diagnosis. Indeed, *M. celatum* could complicate tuberculin skin testing in cattle and serologic screening in wildlife. In conclusion, we report the first detection of *M. celatum* in wild boars but further studies are needed to determine the impact of this mycobacterium in the surveillance strategies related to *M. bovis*.

P.WH.18

An analysis of wildlife human interface in Kenya

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KEYWORDS : human threats ; human wildlife conflict resolutions ; predations

Wildlife in Kenya are found within and outside the protected areas.The few protected areas that are fenced do not fully confine all the wildlife inside it. Moreover a good percentage of wildlife are found in human settled areas.This paper will examine the wildlife human interface which ensues. An analysis of all human wildlife conflicts for the year 2012 in Kenya indicated that of all the 4138 cases noted 38% were of threats to people, 37% on crop destruction,17% on livestock predations, human injury 3.5%, human deaths 1.4% and damage to property1.26%. several measures to mitigate these conflicts will be examined. Animals responsible for these are elephants, buffaloes, baboons, hippos, snakes and crocodiles.

P.WH.19

Conservation of and management of bird species at the fishponds of Hortobágy (Hungary)

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KEYWORDS : cormorant ; fishpond ; goose ; wildfowl

The Hortobágy is the first national park in Hungary established in 1973. The landscape is dominated by grasslands and marshes in the deeper areas with small forests were the soil parameters are suitable. The Hortobágy has a great importance in breeding, migrating and wintering of 342 bird species. After the river regulation works the area was dried out in the 19th century and artificial fishpond systems created in the middle of the 20th century. The fishponds are taken over the role of extinct wetlands. There are several endangered and rare bird species breeding in the fishponds, for example Spoonbill (*Platalea leucorodia*), Great White Egret (*Egretta alba*), Glossy Ibis (Plegadis falcinellus), Pygmy Cormorant (*Phalacrocorax pygmaeus*), Whiskered Tern (*Chlidonias hybrius*). The migrating species including the Lesser White-fronted Goose (*Anser erythropus*), Redbreasted Goose (*Branta ruficollis*) and the fishponds are the main resting place for Common Cranes (*Grus grus*) in autumn migration. The extensive ecological fish management by the Hortobágy Fish Farm Co. in cooperation with the Hortobágy National Park provide a favourable breeding condition for the breeding bird species and the habitat management programs aiming the conservation of endangered species. In the Hortobagy National Park the waterfowl hunting is limited only the Great Cormorant control permitted in the fish producing lakes.

P.WH.20

Can supplementary feeding as a management tool reduce browsing impact on commercial trees?

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KEYWORDS : diversionary feeding ; forest damage ; moose ; pine

Supplementary feeding of wildlife is an increasingly common management practice, often used to reduce herbivore impact in forestry or agriculture. How herbivore natural foraging is related to supplementary feeding at the landscape scale and in the long term, which is of high relevance to wildlife and land management, has rarely been quantified. We have investigated how the landscape-scale browsing impact of moose (*Alces alces*) on Scots pine (*Pinus sylvestris*) varied as a function of distance from feeding stations, and how browsing patterns have changed over time. To quantify landscape-scale browsing impact we surveyed species-specific leader stem browsing, browsing pressure (% browsed of available twigs) and moose density (faecal pellet group counts) in commercial young Scots pine stands. We used positions from GPS-collared female moose to investigate the space use of individuals across the landscape in relation to supplementary feeding stations. After 20 years of feeding, moose density and browsing showed an exponential decrease with distance from supplementary feeding stations at a local scale within 1 km from feeding stations. At a landscape scale (1-10 km), browsing impact did not show any relationship with distance to feeding stations. Leader stem browsing on Scots pine trees, showed no relationship with distance from feeding stations, being high at both the local (< 1 km; 68 ± 12 %) and landscape (1-10 km; 56 ± 7 %) scales. In addition, browsing on Norway spruce (Picea abies), which normally is negligible, increased locally around feeding stations. Our surveys were carried out in south-east Norway where supplementary winter feeding of moose has been used as a management tool for over 20 years. The amount of supplementary feed provided and the number of feeding stations increased during this time period concurrently with the use of feeding stations by moose, and the area affected by high browsing impact. The browsing impact by moose on commercially important trees was sufficiently high that economic consequences could be expected across the landscape. Instead of reducing browsing on Scots pine, supplementary feeding had sustained an artificially high moose population, whilst the abundance of natural forage had decreased. As currently practiced, supplementary winter feeding of moose is an ineffective management tool to reduce browsing impact in commercial forest stands over the long term. Alternative management approaches, which address the relationship between forage availability, forestry practices and moose population density need to be considered to reduce environmental degradation as well as economic losses in forestry, while sustaining a viable moose population.

Abstracts
Posters

Interactions Wildlife-Wildlife

P.WW.01

Ecological impacts of an invasive species in Wallonia, the raccoon (Procyon lotor)

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Raccoons are distributed throughout North America and recently introduced in Europe since 1927 in Germany. Feral populations have been increasingly observed in Europe since then. The first time a raccoon was found in Wallonia was in 1986. From 1986 to 2001, the raccoon was scarcely observed. Between 2001 and 2006, the number of records clearly increased. Nowadays, the raccoon is distributed all over south Wallonia, especially in Ardennes. Although potential impacts of the raccoon on native European biodiversity are poorly documented, its predation activity may affect aquatic molluscs (pearl mussel), amphibians and ground nesting birds (hazel grouse).

The aim of this study is to provide more information about raccoon's diet and about its parasites burden. Raccoon's samples were collected along the roads (road accidents) and forests or shot by hunters and rangers. Each animal was identified, weighed, measured and stored in a freezer. To determine the diet, stomachs were dissected. We analyzed the different items contained in those organs using a reference collection and various specific books. We also determined the relative occurrence frequency in each stomach. Faeces and gut contents were analyzed in order to estimate parasites prevalence, especially Baylisascaris procyonis, a nematode affecting human's health.

Partial results show raccoons mostly eat invertebrates (myriapods, insects and crustaceans), plant foods, such as berries, wheat, corn (on the crops or more often in silos) and vertebrates (eggshells, amphibians, fishes, reptiles and more rarely small mammals). Raccoons are suspected to have high environmental detrimental impacts, affecting European biodiversity by being competitors of native species and disturbing ecological niches, by their high adaptation capacity and their omnivorous behavior. This study, which is still in progress, will provide more information and details about raccoon's lifestyle and its parasites burden in Wallonia.

P.WW.02

Skrjabingylus nasicola as a parasite of Irish stoats (Mustela erminea hibernica, Thomas & Barrett-Hamilton 1895)

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KEYWORDS : infection, ; mammals ; parasite ; skrjabingylosis

A total of 117 stoats was examined for damage by *Skrjabingylus nasicola*. Of these 70.11 per cent showed clinical signs of skrjabingylosis. The presence of the parasite was found across all age groups and between sexes. Adult stoats were more likely to be infected than juveniles, but differences in infection rates were not detected relating to sex or location. Male stoats presented with higher levels of infection than females, although the difference between the sexes was not statistically significant. When located, the number of nematodes in the soft brain tissue of each animal ranged from 1 to 87. How this parasite will respond to the presence of introduced small mammals in Ireland, is speculated upon.

P.WW.03

A wolf (Canis lupus) as a primary regulator of ungulates population of Amur region

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KEYWORDS : deer ; population ; shooting. ; wolf

The purpose of this research work is to determine the level of impact the increase of wolf (*Canis lupus*) population causes upon the population of wild hoofed animals in Amur region (Russia); to substantiate the change of predators' objects of feeding and to estimate the level of damage caused to the regional game preserves.
Field, statistical and questionnaire methods of data collection were used for the research work. Data was collected on the territory of 14 game preserves in Amur region. An inventory of wolf population was done using the methods of individual territory mapping and laying of permanent quadrates. Also field surveys as well as questioning professional hunters and federal gamekeepers were used for the research work.
Deer and wild boar experience enormous anxiety from wolves. Regional game preserve also suffers huge losses from them (over US $15 million a year). Reindeer breeding farms of Russian northern minor nationalities lose yearly over 500 domesticated deer that fall prey to wolves. The incidents of wolves attacking dogs and livestock have become more frequent.
The number of wolves in Amur region during last seven years increased by 4 times from 751 to 2900 animals, and it keeps steadily increasing. Wolf's habitat has expanded considerably to the south and south-east (by 80-140 km) from its natural areas of habitation. Wolves came to live even in the southern areas of the region, where they never appeared before. The wolf's basic feed are Siberian roe deer (Capreolus pygargus) and Ussuri boar (Sus scrofa). A substantial growth of average number of animals in a pack from 3-4 to 7-8 is observed. In the last few years wolf packs have started attacking Ussuri red deer (Cervus elaphus) and Ussuri moose (Alces alces) - a very rare occasion in the past. This can be linked to the lack of natural objects of wolf's feed.
The maximum index of wolf population density in Amur region is 0,17 animals per 1000 hectares which is 3 times higher than Russia's average.
The Amur region administration tries to adopt programs aimed at regulation of wolf population. According to them certain financing is assigned to reward wolf hunters. But these financial allocations are not sizeable enough for hunters and the growth of wolf catch cannot prevent its population from upsurge. Hunter's payoff for one wolf, in the southern areas of Amur region amounts US $250, in the northern areas - US $730. We are witnessing a significant growth of wolf catch, but it cannot stop the predator's population increase. 294 wolves were caught in 2011, and 684 animals in 2012. It is necessary to catch twice as many to stop wolf population growth! Hunters use traps, loose straps and gun hunting, but all of that is not effective enough. The small number of wolf hunters and their advanced age could explain this. Younger hunters do not want wolf hunting because it is quite hard and is not profitable.

P.WW.04

Wood bison (Bison bison athabascae Rhoads) in central Yakutia

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KEYWORDS : breeding ; introduction ; nursery

During the Pleistocene and the early Holocene periods, long-horned Bison schoetensacki, and later short-horned Bison athabascae, inhabited the lands of northeasternAsia including the territory of modern Yakutia. In the late Pleistocene short-horned bisons invaded theNorth America through the Bering land bridge (Flerov and Zabolotsky, 1961) where they live until now. Last bisons inhabited theterritory ofYakutia about 2000 years ago.
In April 2006, 30 wood bisons, born in 2004 and 2005, were delivered toYakutia,RussiafromCanada. During the period from 2008 to 2012 they produced 41 calves (20 cows and 21 bulls). In 2008 overall herd growth was estimated as 23.1%, in 2009 - 26.9%, in 2010 - 30.8%, in 2011 - 42.3% and in 2012 - 25.8%. In March 2011, 30 more bisons, born in 2010, were obtained fromCanada. After that, total population of wood bisons in Yakutia reached 93 animals. Breeding herd is kept within fenced territory of theLenaPillarsNatureParkwith total area of92 ha, while young animals are kept in the nursery within the territory of theSiineParkwith total area of 131 ha. In spring 2013 new batch of wood bisons is expected to be delivered fromCanada.
The rutting lasted from July to September and calving from April 15 to June 15. All cows born inCanadawere involved in breeding, as well as two of three cows born in2008 inYakutia. In 2008 the percentage of spinsters was 53.9%, in 2009 - 46.2%, in 2010 - 38.5% and in 2012 - 46,7%. In 2011 all cows were pregnant and produced calves, however in two cases the calf delivery was unsuccessful.
During summer bisons graze mainly on grasses (12 species) and sedges (10 species). We studied daily and movement activity, sexual and hierarchical relationships and other forms of behavior. We also examined nutritive values of major types of forage, and its digestion rates by lignin content in plants and feces. Direct and indirect influence of bisons on vegetation and pasture yielding capacity, have also been tested.
During winter bisons are fed with hay, haylage and combined feed. This is required during early stages of their acclimatization to severe winter conditions of Yakutia. During the periods of November - December 2011, and May 2012 - January 2013 adult males were not supplemented with additional forage. As it came out, they can easily survive and tolerate extreme winter conditions without supplementary food by grazing trough snow.
At present, the adaptation of wood bisons to new climate conditions, characterized by long winters with extremely low temperatures and short summers, is going well. In future, increasing reproduction of bisons in captivity will help us to solve the issues related to their release into the wild.

P.WW.05

Size and demographic structure of tundra reindeer populations (Rangifer tarandus L.) in North-East Asia

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KEYWORDS : Chukotka ; reindeer husbandry ; Yakutia

In the beginning of the 19th century tundra reindeer inhabited the entire northeastern part of Asia. The overall size of tundra populations at that period exceeded 1 million animals. At the turn of the 20th century the number of wild reindeers decreased because of herding and overhunting. Reindeer populations completely vanished from the Chukotka peninsula, leaving only sparsely distributed populations in the adjacent territories. In Yakutia the remaining reindeer populations settled in the lower Lena and its delta, the northwestern part of the Yana-Indigirka lowland, and also in the territory between the Indigirka and the Kolyma rivers. In the middle of the 20th century reindeer populations began to recover in northern Yakutia. Those populations had optimal age and sex structure that had formed because of the absence of reindeer herding and hunting in that remote area. The buck/cow ratio in those populations was 1:2 and the percentage of calves was about 27-28%.
In the early 1960th, three populations had formed in northern Yakutia : the Lena-Olenek, the Yana-Indigirka and the Indigirka-Kolyma populations, with total size of 80000 animals. By the early 1990th this number further increased and stopped growing after reaching the maximum of 230000-250000 animals. During the period from 1987 to 2002, the Yana-Indigirka population with total of 130400 animals declined to 34000 animals. This dramatic decrease caused negative changes in the age and sex structure of the population. In 2002 the buck/cow ratio in this population was close to 1:1 and the percentage of calves dropped down to 15.6%. Similar pattern was also observed in the Indigirka-Kolyma population, which decreased from 40000 to 28500 animals during the period of 1993-2002. The Lena-Olenek population is the only stable population that continue to increase (during the period of 1994-2009 the size of the population increased from 77800 to 95 400 animals respectively). This population is characterized by less affected age and sex structure with buck/cow ratio 1:1.5 and the percentage of calves - 22.4%. In 1974 the size of the biggest Central-Chukotka herd, which was characterized by normal age and sex structure (bucks - 25%, cows - 49% and calves - 26%), was estimated as 3500-4000 animals. Other three groups of reindeer in this region were relatively small. In 1988 the size of the wild reindeer population in this region was roughly estimated as 16000-18000 animals, however the growth of the population was limited by reindeer herding. During 1990-2000 the number of wild reindeers increased to 80000-90000, and later (2003-2008) it further increased to 100000-120000 animals. Such increase was primarily caused by decline of reindeer husbandry in Chukotka, and also by reindeer migration from Yakutia during the late 20th century.

P.WW.06

The Roe deer genetic variation in different forest bioclimatic regions of Lithuania

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KEYWORDS : bioclimatic region ; ecotype ; genetic variation ; microsatellite

The aim of the study was to identify the genetic variation in Roe deer living in different bioclimatic regions in Lithuania. There are four bioclimatic regions distinguished in the country and 14 samples of Roe deer DNA were taken from each region. Totaly we have tested 56 samples taken from Roe deer masseter tissue, culled during 2010 - 2012 year game seasons. In Lithuania mosaic forest landscape two ecotypes of the Roe deer identified in previous studies : the 'forest' Roe deer and the 'field' Roe deer. The first ecotype is typical for the landscapes dominated by forests with various open areas proportion as well as the latter - extensive woodless habitats. The genetic variation between two roe deer ecotypes was assessed in all four bioclimatic regions of the country. To analyse the genetic variation between roe deer we have amplified the DNA using five microsatellites.

P.WW.07

The population status of the woodpigeon in Eastern Europe

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KEYWORDS : Eastern Europe ; population ; woodpigeon

The Woodpigeon *Columba palumbus* is important game species in Europe. The evaluation of the status of breeding and wintering populations of the Woodpigeon in various regions is essential for sustainable management of this species in Europe. The total Eastern European breeding population of Woodpigeon is estimated at about 2 million pairs. This population is stable or slightly increasing. Surveys of breeding Woodpigeons were performed in 78 selected sample plots of the European Russia, Belarus, Ukraine and Lithuania in 2008 - 2012. The sample plots well represented the general structure and distribution pattern of forests, agricultural and urban areas characteristic of the region concerned. The breeding densities of the Woodpigeon were estimated using the standard line transect method. Surveys of wintering Woodpigeons were performed in all countries of Eastern Europe in 2011-2012. The total counts of wintering birds were used. The results of this study have revealed that unlike in Western and Central Europe the Woodpigeon remains almost exclusively woodland and rural species in Eastern Europe. In woodland areas the highest breeding densities of Woodpigeons (up to 30 pairs/100 ha) were recorded in mature spruce Picea abies and in mixed spruce - oak *Quercus robur* forests. In agricultural areas the highest breeding densities of Woodpigeons (up to 50 pairs/100 ha) were found in certain sites of western Ukraine. A semi-colonial nesting of Woodpigeons was recorded in certain urban sites of Eastern Europe, with highest breeding densities (up to 150 pairs/100 ha) recorded in Kaliningrad city. At present the eastern range of the distribution of well developed urban populations of the Woodpigeon in Europe stretches approximately along the western border of Lithuania, Belarus and Ukraine. Only initial phase of urbanization is characteristic of Woodpigeons breeding in the Baltic States, central Belarus and Ukraine, while this species was not recorded breeding in towns of eastern Belarus, Ukraine and in the major part of the European Russia. The recent expansion of abundant urban populations of the Hooded *Crow Corvus corone* cornix and other corvid species in many towns of Eastern Europe restricts further eastwards expansion of Woodpigeons in new urban habitats. During this study important wintering sites of Woodpigeons were designated along the Black Sea coast of Ukraine and Russia. In warm winters this region can support up to 300,000 - 400,000 wintering birds, with main wintering sites located in Crimea, the Danube River delta area and in Sochi region at the coast of Caucasus.

P.WW.08

Population dynamics of hunting mammals in Russian Middle Amur area : external factors influence

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KEYWORDS : external factors ; hunting mammals ; mathematical modelling ; Russian Middle Amur area

The detailed analysis of long-term registration data for the main hunting mammal animals is carried out. Two main purposes of the study are (i) a quantitative Investigation of the population size dynamics of hunting mammals (the elk, Manchurian deer, wild boar, roe and squirrel) in the Russian Middle Amur area; (ii) analysis of the external factors and hunting influence on reproduction and space-time dynamics for this species.
The approach based on mathematical modeling is used for the description of tendencies in the population size dynamics and estimate of external factors influence. General mathematical model of the population dynamics of harvest species has been developed.
It is shown, that maintenance of the population size for many game species is determined by their migration activity. Decrease of the ungulates number is often consequence of snowy winter in the years, prior to reproduction.
According to model parameters estimation the birth-rate and survival of the hunting animals (the wild boars and squirrels for example) depend on the available forage reserve (the cedar nut and acorns of Mongolian oak). A forestland decrease, caused by felling and fires, results in the wild animals' reduction which takes place with a lag of two - three years.
In this way it is shown that a change in the wild animals' number is determined by hunting intensity, forage reserve and snow depth in the years, prior to reproduction. A lean year and a lot of winter precipitations unfavorable influence the population preservation. The animals have to die from starvation or migrate in search of better fodder conditions. Reserved territories promote preservation of hunting species and determine even some growth in their population size, but it is obviously insufficient.
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P.WW.09

Population dynamics of game animals in Russian Middle Amur area : results of simulation

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KEYWORDS : density-dependent factors ; game animals ; population dynamics ; simulation

This paper analyzes the basic tendencies and population mechanisms arising from the effects of density-dependent factors. We investigate the population dynamics of several species inhabiting the Russian Middle Amur territory (Manchurian deer, wild boar, mink, squirrel, and wolf). We utilize data from the annual reports of winter track surveys to estimate trends in population size. We propose a mathematical model that considers population age structure and changes in vital parameters (fertility and survival) to analyze the trends and mechanisms of population dynamics. We conduct a detailed numerical and analytical investigation of the model. The population parameters of the basic game animals are estimated.

The estimated model coefficients show that the dynamics of the wild boar population is significantly regulated by the density-dependent limitation of juvenile survival. The calculated estimates are based on the stability boundary of the proposed model. The estimates suggest that environmental factors cause fluctuations in the population size of wild boars. The changing forage conditions and climatic conditions (snow depth) lead to population fluctuations.

In recent years the growth of thered deerpopulation has been observed. Birth rate depends strongly on population size because of the territoriality of this species. Intensive hunting ofred deeroccurs in the Russian Middle Amur territory, which explains the low survival rate of the older individuals.

Simulation reveals that intraspecific competition for offspring survival results in the regulation of the size of the mink population.

Short-period fluctuations occur in the squirrel population. The significant peaks in the number of this species depend on the available forage reserve. However, the simulation results show that density-dependent regulation of juvenile survival also affects the appearance of oscillations.

Quantitative analysis indicates that density-dependent or external factors influence the fluctuations in the population of game animals. However, self-regulation processes exist in any population. Considering these processes is necessary because these processes influence population development. The simulation results demonstrate a situation in which the model parameter estimates are in the unstable area near the boundary of stability. This condition suggests that the irregular dynamics of natural populations is caused by external factors. However, a slight change in the population parameters can move such estimates from the unstable area to the domain of stability, leading to a steady-state population. Considering these parameters is important in population size forecasting.

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P.WW.10

Ecological niche differentiation : How do barking deer and four-horned antelope manage to coexist ?

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KEYWORDS : Bardia National Park ; mosaic habitat ; solitary ungulates

Differential resource use allows a diversity of species to co-exist in a particular area by specializing in individual ecological niches. Barking deer Muntiacus muntjak is relatively common throughout its wide distribution range, however four-horned antelope Tetracerus quadricornis is endemic to the Indian subcontinent, and has restricted distribution in Nepal and India. Current literature indicates that both species use exclusive areas in India; in lowland Nepal, however, they appear to co-exist. This study aims to assess how these two similarly sized solitary ungulates manage to coexist in Bardia National Park, Nepal. For the study, indirect sign (fecal pellets) survey was carried out in the Babai valley, Bardia National Park. Space use patterns and habitat associations of both species were studied using belt transects of 20m width. These were laid down in the field at a distance of 150m with the random start for the first transect. Habitat variables were assessed within a 20m radius circles along the transect at 150m intervals. In a total of 1993 sample plots, 461 and 920 plots were found to be used by four-horned antelope and barking deer, respectively. Logistic regression modeling revealed that four-horned antelope preferred dry relatively open forest with short trees in hilly terrain with frequent wild-fires; while barking deer preferred moist, mixed lowland forest with dense canopy which are less impacted by fires. Moreover, occurrence of four-horned antelope was negatively associated with grass cover while it was positively associated with grass height. Unlike to the dominance of dry deciduous forest in the areas of four-horned antelope distribution in India; Bardia National Park in Nepal has mosaic habitat from moist forest to dry deciduous forest which makes the co-existing of both species possible. In conclusion, despite their niche differentiation, co-existence of the two ungulates in lowland Nepal can be explained in terms of space and resource use patterns in a landscape with a fine-grained habitat mosaic.

P.WW.11

The role of carnivore vs. conspecific scents on rodents' behaviour and seed dispersal

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KEYWORDS : Apodemus sylvaticus ; genet ; odour cues ; trophic interactions

Seed-caching rodents play a key role in the ecology of seed dispersal by not only consuming but also dispersing seeds. Rodent foraging behaviour is usually framed within optimal models which predict that their decisions should maximize food intake and minimize foraging costs. However, rodents are common prey for many carnivore species, thus their foraging activity is under high risk of predation. Yet, although predation risk by carnivores, as seed pilferage by conspecifics, have been envisaged as two potential costs, their relevance for seed-caching behaviour and seed dispersal has barely been addressed.
To test the effect of predation and pilferage risk on the patterns of seed predation/dispersal by rodents, we performed a field experiment using a tri-trophic-level model (plant-mice-carnivore; Quercus spp- Apodemus sylvaticus-Genetta genetta,) and the scents of the carnivore and conspecifics as direct cues. The behaviour of mice was analyzed with video cameras set for continuous recording on consecutive nights and we used tagged acorns to assess the patterns of acorn predation and dispersal.
Our results revealed that rodents responded to the direct cues of carnivores and conspecifics, discriminating between the scents of genet and rodents, and modifying their seed dispersal behaviour accordingly. Mice displayed more 'vigilance and freezing' behaviours in the cages with genet scent and delayed the removal of acorns. Conversely, in sites with conspecific scent mice spent more time 'sniffing', acorns were removed at shorter distances and were consumed at lower rates. These results show that chemosensory information on carnivores and conspecifics influences the foraging decisions of seed-caching rodents over short spatial and temporal scales. This might entail cascading effects on the regeneration of plants. In sites where rodents perceive the risk of predation, inefficient foraging behaviour may result in less successful seed dispersal. Conversely, the detection of conspecific scents may increase dispersal efficiency and seedling recruitment.
Ultimately, the relationships between two distant levels in trophic webs (plants-carnivores) appear intricate, since carnivores may affect seed dispersal by changing the foraging behaviour of their prey (the seed disperser). This indirect relationship among trophic levels should be considered as a new dimension of the ecology of seed dispersal by small rodents.

P.WW.12

The status and population genetic structure of Mallard Anas platyrhynchos in Eastern Europe

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KEYWORDS : Mallard ; population ; status

The Mallard Anas platyrhynchos is important game species in Europe. The population status of the Mallard in Eastern Europe (in the European Russia, Belarus, Ukraine and the Baltic States) was analyzed and compiled in 2008 - 2010. The investigation of population genetic structure of ducks breeding in various regions of Eastern Europe was performed in 2010 - 2013 based on mitochondrial and nuclear DNA markers. The total breeding population of Mallard in this region was estimated at up to two million pairs. A marked decline of breeding populations has been registered in the region since the 1960s - 1970s. It was mainly caused by the loss or degradation of breeding habitats. A marked increase in numbers of ducks inhabiting urban habitats and man - made wetlands has been recorded in all countries of the region. The largest breeding densities of Mallard (more than 100 pairs/100 ha) are found on open islands of lakes and water reservoirs, also in urban habitats. Internationally important staging sites of the species were recently recorded in 21 territories of Eastern Europe. All populations of Mallard of Eastern Europe origin were strictly migratory until the 1970s. At present most birds breeding in southern and western parts of Eastern Europe are partially migratory or sedentary. There is a little justification for existence of any separate populations of Mallard in the Western Palearctic region, though the data of genetic analysis indicate certain differences in genetic population structure between birds breeding in the Baltic and the Black Sea regions. A distinct genetic population structure is characteristic of birds breeding in Iceland. The data of the genetic analysis indicate that certain newly established sedentary populations of Mallard in Eastern Europe are formed by the local partially migratory ducks. The results of this study can be used for sustainable management of Mallard in Europe.

P.WW.13

Intraspecific diversity of Capercaillie Tetrao urogallus population in Belarus

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KEYWORDS : Capercaillie ; D-loop ; genetic differentiation

The Capercaillie (*Tetrao urogallus*) is a rare and protected species in most countries of the European Union, but it is still common and valuable game species in Belarus. The data based on morphological and regional distribution differences between birds implies the existence of different subspecies of Capercaillie in the country. Specifically, *Tetrao urogallus major*, which is sparsely distributed in western part of Belarus and *T. urogallus pleskei*, abundant in northern, central and eastern regions. The molecular data are necessary for sustainable management of this species. Consequently, the present study has evaluated the intraspecific genetic diversity of Capercaillie population in Belarus based on mitochondrial and nuclear DNA markers. 26 specimens of Capercaillie tissues, collected in 2009 during legal hunting season, and 33 feathers, collected non-invasively in 2011, were used as a source of DNA for genetic analysis. It was determined that this population is characterized by a high diversity of haplotypes identified after sequencing of D-loop region 355 bp length fragments. Based on haplotypic network it was shown that phylogenetic relationships of haplotypes found in Belarus population indicate its close relations with Russian and Finnish populations. Extensive gene flow between investigated population and neighbouring populations as well as inside the country helps to sustain genetic diversity, which suggests that habitat conditions for this species in the northern, central and eastern parts of the country, despite occuring fragmentation, are still sufficient to maintain effective gene flow. A unique population genetic structure is characteristic of decreasing *T. u. major* subspecies inhabiting the western part of the country. It is likely that increased homozygosity, which was observed within the studied population is caused by the specific mating strategy, and such non-random mating may also be the reason of noted deviation from Hardy-Weinberg equilibrium. The data obtained by both mitochondrial DNA and microsatellite DNA markers indicate genetic similarity of those studied individuals which represent *T. u. pleskei* and *T. u. major* subspecies. The results of the study confirm the need of special protection measures of the unique and decreasing population of T. u. major in Belarus.

P.WW.14

An ICE-based monitoring for roe deer in sympatry with red deer in Belgium

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KEYWORDS : body mass ; Capreolus capreolus L. ; jaw lengths ; kilometric index

In Belgium, roe deer is the most common wild ungulate. The species is widely spread and shares around 55% of the forests with red deer in South Belgium. Since indicators of ecological change (ICE) based on roe deer biometrics [cite reference] are validated for roe deer living without any interaction with other ungulates, we investigated the same ICE in forests where both species are sympatric to assess their relevance and sensitivity.
The Hertogenwald forest (6000ha) is one of the Belgian study areas. The bag statistics show that it is mainly dominated by red deer : the ratio culled red :roe deer = 4:1. Since 2004, several ICE are measured on roe deer. Amongst them :

Indicators of animal performance measured on culled animals (from October till December) are based on :
Condition : body mass (BM)
Constitution : jaw lengths : total jaw length (TL) and minimal diastema height (MDH)
Fertility : number of corpora lutea (CL) of ovaries
Also, each deer is sexed and aged, considering different age classes determined by using dental eruption and tooth wear.

Indicators of population abundance (from February till April) :
Kilometric index(KI) : number of roe deer per kilometre of transect sampled on foot at dawn and dusk
Night kilometric index(NKI) : number of roe deer per kilometre of road sampled by nightcounts
As the red deer population declined continuously from 2004 till 2012, we used the NKI red deer to analyze the possible impact of red deer on roe ICE.

First results
The BM is statistically different between age but not between sex : 8,3 (±1,7) kg for calves and 14,1 (±2) kg for adults
For calves and adults, linear regressions are significant between BM and KI (or NKI roe deer but not with NKI red deer).
TL and MHD are statistically different between age but not between sex :TL : 120,00 (±5,38) mm for calves and 143,09 (±5,61) mm for adults ;MHD : 9,11 (±0,72) mm for calves and 10,04 (±0,67) mm for adults
Linear regression between TL and KI is significant for calves
Linear regression between MHD and KI is not significant for calves (nor adults)
Differences between yearlings and adults are almost significant : mean number of CL = 1,4 (±0,6) for yearlings and 1,8 (±0,5) for adults
80% of adults have 2 or 3 CL (2% are no pregnant, 17% with 1 CL, 78% with 2 CL, 2% with 3 CL)
The regressions with the different indicators of population abundance are not significant
The regression between BM and the number of CL is significant. The mean body mass of adults with 0 / 1 / 2 / 3 CL is respectively 9,1 / 13,8 / 14,5 / 16,1 kg
In conclusion the ICE monitoring showed coherent results for roe deer. No indicator seems to be affected by red deer variation in density even if mean values of the indicators are lower than these observed in forests free of red deer.

P.WW.15

Investigations of Sarcocystis rileyi infection in birds of the order Anseriformes in Europe

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KEYWORDS : Anseriformes ; genetic identification ; infection prevalence ; macrocysts

Up to date macroscopic sarcocysts, resembling a grain of rice, detected in muscles of more than 15 birds species of the order Anseriformes in North Americawere attributed to *S. rileyi* species. The meat of hunted ducks infected with *S. rileyi* macrocysts is not suitable for food due to toxic effect of cysts, which could cause health problems of human and animals, therefore infected birds should be utilized. In Europe S. rileyi infection was not confirmed yet. In order to fill the gap in the knowledge concerning distribution range and species specificity of macrocysts during the period 2010-2013, 648 birds, hunted or found dead in Lithuania, Finland and Russia (Kaliningrad district), belonging to 16 species of the order Anseriformes, mainly mallards, were examined for Sarcocystis macrocysts. Sarcocyst wall structure was investigated by electron microscopy. Seven primer pairs designed for amplification of ITS-1 region, 18S rRNA gene and partial 28S rRNA gene sequences were used for diagnostics of Sarcocystis species. According to the results of the cyst wall ultrastructure and the DNA analysis of Sarcocytis macrocysts isolated from naturally infected mallard duck (*Anas platyrhynchos*), hunted in Lithuania, *S. rileyi* infection has been confirmed in Europe for the first time. S. rileyi macrocysts were also identified in Finland in the Eurasian widgeon (*Anas penelope*) and the Eurasian teal (*Anas crecca*). Cysts were found almost exclusively in the breast muscles, were yellowish white, in the size of 3.0-7.0×1.5-2.0 mm. S. rileyi infection prevalence in mallard in Lithuania was 7.0% (25 infected out of 358 investigated), in Russia (Kaliningrad district) - 9.3% (10 infected out of 107 investigated) and in Finland 12 cases of these parasites were reported, but unfortunately exact number of examined birds was not recorded. To our knowledge, macrocysts were also recorded in mallard in Sweden, Netherlands and Austria and in widgeon in the UK (data from personal communications). All studied S. rileyi isolates from Lithuania and Finland were genetically identical. Furthermore, all European isolates differed only by one nucleotide within ITS-1 region in comparison to two *S. rileyi* isolates, extracted from mallard in the USA. The lack of intraspecific genetic diversity among studied macrocysts could be explained by the assumption that these parasites have recently spread to the Europe from the North America. Phylogenetically, S. rileyi was most closely related to other avian Sarcocystis species whose definitive hosts are predatory mammals. The definitive host of *S. rileyi* is the stripped skunk (*Mephitis mephitis*) distributed exclusively in North America, while definitive host in Europe is still unknown. Primary results of Sarcocystis macrocysts in anseriforms shows that *S. rileyi* infection is important, but poorly studied in Europe. Birds of the order Anseriformes are among the most intensively hunted birds in Europe, therefore further comprehensive investigations of *S. rileyi* prevalence and life cycle disclosure in Europe are required.

P.WW.16

Influences of fox (*Vulpes vulpes*) on Natura2000 and game species : a literature study

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KEYWORDS : conservation ; management ; predation

In Flanders, just like in neighboring regions and countries (Bourdouxhe & de Tillesse 2009; KNJV 2010; Davey & Aebischer 2007), the population of fox (Vulpes vulpes) strongly increased the last ten years (Scheppers & Casaer 2008). Many complementary studies confirm the omnivorous (Jankowiak 2008; Hartová 2009; Contesse 2004) and opportunistic (e.g. Hartová 2009; Contesse 2004; Mulder et al. 2004) character of fox. Ground breeders, such as several game birds and many Habitat species (species protected by the Natura2000 network), are especially vulnerable to fox predation. Moreover fox, just like some other carnivores, perform 'surplus killing' (e.g. Kruuk 1964; Southern 1985; Kruuk 2002). This 'surplus killing' affects, in first place, species living in colonies without an efficient defense mechanism against predators in nature (Kruuk 1964; Southern 1985).
Van Den Berghe (2005) argues -with his predator-prey model- that the population of foxes will stabilize at a certain level, in balance with external factors like the population of prey-animals and environmental conditions. As foxes are generalists (e.g. Hartová 2009; Contesse 2004; Mulder et al. 2004), the abundance of any type of prey is not regulatory upon the density of foxes (Gibbons et al. 2007). If any type of prey becomes scarce, foxes will simply switch to another type of prey, or to cultivated crops and anthropogenic food-sources which are abundant in the urbanized landscape in Flanders. Predators whose numbers are sustained by an alternative common 'prey' can cause the decline, or in some cases even the extinction, of more rare prey species (Gibbons et al. 2007).
Several studies (e.g. Dijkstra & Zijlstra 1997; Hötker & Segebade 2000; La Haye et al. 2008) confirm the large effect of predation by foxes on the reproduction success of species such as Pied Avocet (Recurvirostra avosetta), Grey Partridge (Perdix perdix) or European hamster (Cricetus cricetus). For the grey partridge (Perdix perdix) (Tapper et al. 1996), the Lapwing (Vanellus vanellus), the European Curlew (Numenius arquata) and the Golden Plover (Pluvialis apricaria) (Fletcher et al. 2010) experimental field studies indicated a strong increase of both autumn and spring populations when predator control took place relative to the unmanaged condition. Controlling predation can thus significantly improve the conservation of ground breeding species (Gibbons et al. 2007; Fletcher et al. 2010). Therefore, a well-designed predator control is a useful instrument helping to obtain objectives proposed for Habitat species and declining game species populations (Gibbons et al. 2007).

P.WW.17

Habitat selection by wolves in Ligurian Apennines (North-western Italy)

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KEYWORDS : Canis lupus ; Kernel Analysis ; Northern Apennines ;
Tessellation Stratified Sampling

The current distribution of wolf in Italy is the result of a natural expansion, which took place after the 70's eradication in the most part of Italian Peninsula. From a wreck population located in Southern and Central Italy, wolf has recolonised Northern Apennines and reached the Alps through the ecological corridor represented by Ligurian Apennines (NW-Italy). The aims of this study were to define habitat requirements of wolves in a key area for the conservation of the predator in Italy and to detect the range expansion and the increase of wolf pack number. We monitored wolf presence in Liguria from 2009 to 2012 by the Tessellation Stratified Sampling method (TSS), which gets the best distribution of random samples. The study area has been divided into 100 km^2 sample units, each containing at least one transect randomly selected among the existing footpaths, for a total of 64 transects and 289 km. We covered every transect four times a year (once a season) in order to collect wolf and wild ungulate signs of presence, then mapped and digitized by ArcGis 10.0. We defined the range of wolves and the core areas by Kernel Analyses at 99% and 50%. We analyzed habitat selection at two levels : home range and core areas use (% of habitat types) vs. study area availability and within home range and core areas use (% of presence signs in habitat types) vs. home range and core areas availability. We used the Ivlev index of electivity for the first level analyses and the w index of selection for the latter. Kernel Analyses showed an increase of wolf range in Ligurian Apennines from 2009 to 2012 and the presence of four core areas, which could be identified with the pack territories. Habitat selection analyses showed selection for medium-high altitude, probably related to the presence of woods and pastures, and avoidance for low altitude, where human pressure is strong, proved by the large amount of human settlements and arable lands. The identification of environmental variables that influence the presence of the predator and the consequent protection of suitable habitats and areas are powerful means for wolf conservation.

P.WW.18

Mothers Baby, Fathers Maybe : occurrence and frequency of multiple paternities in European Wild Boar

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KEYWORDS : half sibs ; littermates ; mating behavior ; microsatellites

The occurrence of multiple paternities is common in mating systems of a lot of animal taxa and also documented in several ungulate species. It describes the genetically fatherhood of more than one male within one females litter. Common knowledge of European Wild Boar (Sus scrofa) behavior in which single dominant males monopolize several females suggests this mating behavior as a rare phenomenon in this species. Nevertheless in the last years evidence has been found all over Europe that multiple paternities occur more often in Wild Boar than assumed. While some studies could provide only small sample rates or were conducted in heavily hunted areas, a representative study for a regular hunted German Wild Boar population was missing.
The aim of this study was to investigate whether multiple paternities occur in Wild Boar populations of Lower Saxony (Germany) and how often it did occur. If female mating behavior is strictly monogamous all littermates should be full sibs. Embryonic and uterus tissues of 40 pregnant females - more than 300 samples - were analyzed with 11 highly polymorphic microsatellite markers (PIC > 0.8). The father's genotype was reconstructed and the frequency of the occurrence of multiple paternities was calculated with the software packages Cervus 3.0.3 and Colony 2.0 respectively.
In more than 20% of the investigated uteri the given fetal genotypes could only be explained with the assumption of at least two different fathers and in two cases with at least three. In consequence, a minimum of 50 different fathers had to be concerned in reproduction. Simulations without the reconstructed paternal genotypes suggested even a higher rate of multiple paternities due to hidden incidences were both partners carried the same alleles.
In the light of these results some assumptions of the mating behavior of the European Wild Boar should be considered in a new way at least for regularly hunted populations.

P.WW.19

IMPACTBOAR : analyzing the impact of wild boar expansion in alpine and sub-alpine Pyrenean environments

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KEYWORDS : climate change ; disturbance ; pastures ; Sus scrofa

Land use change and global warming are two processes responsible for the current changes in the distribution areas of many plant and animal species worldwide. In Europe, the considerable expansion of wild boar (Sus scrofa) during the XX century has also been evident in alpine and sub-alpine environments, where they have been observed at above 2000 m a.s.l. during summer. As two of the main factors that limit the presence of this species in this type of environment are the persistence of frozen ground and snow cover depth, global warming will likely favor the demographic expansion of wild boars and, ultimately, increase their impact. Indeed, wild boars can cause significant alterations of alpine and sub-alpine ecosystems, by modifying the flora composition and physiognomy of the pastures, impairing the natural regeneration of tree species, influencing the population size and behavior of other animal species (e.g. small scatter-hoarding rodents essential for seed dispersion). However, there is still scarce information on the effects of wild boar on alpine and sub-alpine environments.
The main aim of the IMPACTBOAR project is to analyze wild boar's presence, abundance and seasonal use of habitats in the National Park of Aigüestortes-Sant Maurici in the Catalan Pyrenees (NE Spain) and their impact on different key elements and processes of these alpine and sub-alpine ecosystems. We have started analyzing the impact of wild boar on : (i) the diversity and structure of pasture communities, (ii) the recruitment of different tree species, (3) the populations of scatter-horading rodents (*Apodemus sylvaticus, A. flavicollis*) and their seed dispersal behavior. According to the results obtained we will propose potential management strategies to ensure that the presence of wild boar is compatible with the conservation values of the alpine and sub-alpine environments in the National Park.

P.WW.20

Brown hare abundance after wildfires in Mediterranean ecosystems

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KEYWORDS : abundance indicators ; hunting ; mammals ; vegetation structure

We report on the abundance of European brown hare (Lepus europaeus) after wildfires on two sites of Macedonia. Specifically we tested the hare relative abundance using two methods : spotlighting and faeces counts, on burned and adjacent unburned areas with similar vegetation and topography. Fire influence on vegetation was calculated and was regressed with hare relative abundance in micro-scale level. The hare abundance was lower the first year after the wildfire on burned areas comparing to unburned. This difference was more intent on intensely burned areas where the wildfire destroyed completely the vegetation. The opposite was found the second year, the hare abundance was higher on burned areas. According to faeces counts the higher abundance on burned areas was continued in third and fourth years. At the fifth and sixth year after wildfire we did not find a significant difference. At a microscale level, we found a higher number of hare faeces on places with higher fire influence on vegetation. We suggest that the wildfires cause a short-term decrease of hare abundance, which is overbalanced after one year with a higher abundance on burned areas from the second to fourth year. This was possibly due to the opening of dense shrublands and woodlands and the reduction of predation which have as result the higher survival of young hares.

IUGB 2013

P.WW.21

An exclosure experiment to assess the impact of ungulates on plant diversity in Belgium

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KEYWORDS : enclosure-exclosure ; forest management ; herbivory ; species richness

The Belgian forest fulfills three main functions : an economical, an ecological and a social one. The impact of large herbivores on vegetation is often seen as negative especially regarding timber production. With a network of enclosure-exclosure plots, it is possible to measure the impact of ungulates, not only on productive species but as well on all the species constituting the floristic communities which characterize the habitats of the study site.
The erosion of biodiversity being prominent, it makes it a hot topic. It is therefore important to understand the phenomenon in order to better counter it. This erosion is caused by several factors. Global warming or anthropogenic pressure on the environment are often mentioned for explain the variation of biodiversity. However, large ungulates,which occupy a large part of the Walloon forests (roe deer, red deer and wild boar), can also influence the distribution, assemblies and dynamics of plant species, and therefore impact the biodiversity of our temperate forests. The aim of the present study is to identify changes in forest understorey vegetation due to the pressure exerted by wild ungulates.
This study was conducted on a high plateau of the Ardenne, in the forest of St Michel Freyr (Ardenne - South Belgium). The device of 244 plots was established in 2000. Each plot consisted of two closed enclosures of 4 m^2 each and one exclosure of 4 m^2 as control under pressure of ungulates. Sampling was carried out systematically by a square mesh with sides of 500 meters. The recovery rate and height of some easily identifiable species were measured regularly since 2000. Regarding 150 plots, they have been analyzed in detail 10 years after the installation of fences. All species were identified and recovery rates estimated.
The results show that the response time of vegetation following the implementation of fences is slow on this high plateau. However, some species respond positively to the protection against herbivory. These plants are consumed by ungulates, which limits their development in height and/or area. It is mainly woody species, among which the most affected are : Vaccinium myrtillus, Fagus sylvatica, Calluna vulgaris and Picea abies.
A more detailed analysis shows that, generally speaking,the richness of species is higher in exclosures than in enclosures. This means that the herbivory promotes diversity of plants species. Due to browsing on ligneous by ungulates, some other species are favored by a decrease in the competition with tree regeneration. Most favored species are rushes *(Juncuseffusus), sedges (Carexpilulifera, Carex ovalis, Carexp allescens), luzules (Luzulaluzuloides, Luzula multiflora) and graminoids (Agrostiscapilaris, Agrostis canina, Deschampsia cespitosa).*

P.WW.22

Population status, density and trends of chukar partridge (Alectoris chukar) in Greece

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KEYWORDS : Alectoris chukar ; density ; Greece ; trends

Chukar partridge monitoring in Greece started in 2004 as a continuous annual census program financed by the Hunting Federation of Sterea Hellas and was conducted in Cyclades islands and specific mainland areas.

In Greece, the species' natural breeding range includes the western half of Thrace (*A. chukar kleini*) where it is naturally sympatric with the rock partridge (*A. graeca graeca*), most Aegean islands and Crete (*A. chukar cypriotes*). Since 1976 it has also been introduced, thru annual releases of approximately 80.000 individuals, in the Greek mainland where it maintains small isolated populations and in the islands of Euboea, Kerkira, Cephalonia and Kithira, all within the natural range of rock partridge, with identified geographical spots of hybridization between the two species. It was also introduced in the island of Zakynthos, where no natural partridge population existed. After the year 2000, releases continue only in the islands and from 2009 onwards, chukars are released under strict legislation, with an annual rate of approximately 20.000 birds.

Monitoring was conducted only in areas where no releases have taken place. Gamekeepers of the Hunting Federation of Sterea Hellas used fixed line transect counts with the use of pointing dogs during spring and late summer of each year, both within wildlife refuges and hunting areas. During summer, adults and sub-adults were counted separately. The presence of terrestrial predators, through direct observation or signs, was also recorded. Chukar partridge density was calculated using Distance 6.0 software.

The species' mean density in the study area was 0.53 ind/ha (range : 0.08-1.83, 95%CI: 0.44-0.62), with no interannual differences demonstrating a stable population trend (Kruskal-Wallis chi-squared=2.6939, df=8, p=0.9521). Chukar partridge density was not different between hunting areas and wildlife reserves (Wilcoxon rank-sum test: W=537, p=0.2132). Predation had an important negative effect on chukar partridge density (Wilcoxon rank-sum test: W=957.5, $p<10^{-4}$). Higher densities were recorded during summer due to reproductive output (Wilcoxon rank-sum test: W=99, $p<10^{-10}$)

Combination of the four variables of the dataset (year, season, area and predation) resulted in unique density values in each case; therefore interactions between factors had to be tested with four different three-way factorial ANOVA models which had a good fit to the log-transformed density values. No significant interaction occurred between these variables, but predation was again proved to significantly decrease the species density and summer period to present significantly higher values.

The age ratio of sub-adult to adult chukar partridges (mean: 1.99, range: 0.07-8.00, 95%CI: 1.70-2.28) did not differ between hunting areas and wildlife reserves (Wilcoxon rank-sum test: W=2078, p=0.4152) and was stable during all years of the study, in both hunting areas (Kruskal-Wallis chi-squared=5.682, df=8, p=0.6828) and wildlife reserves (Kruskal-Wallis chi-squared=2.2024, df=8, p=0.9742).

Interannual stable population trends, as well as similar densities and age-ratios both in hunting areas and wildlife reserves, attest to population stability and sustainable harvest of chukar partridge in Greece. Possible conservation measures could include control of terrestrial predators such as the red fox, beech marten and feral cats.

P.WW.23

Population density and trends of Wild boar (Sus scrofa) in central Greece

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KEYWORDS : density ; Greece ; Sus scrofa ; trends

Wild boar monitoring in central Greece started in 2004 as an annual census program financed by the Hunting Federation of Sterea Hellas and it covers the whole region of Sterea Hellas, extending from Ionian Sea (to the west) to the Aegean Sea (to the east), covering approximately 2,400,000 ha.

In Greece, wild boar is a popular and native game species. Its' natural breeding range includes all regions of continental Greece, including Peloponnesus region and Euboea island, where wild boar population were re-introduced after releases. Wild boar is also present in the island of Samos where its' population has been defined to have haplogroups of a Near East origin.

Monitoring in central Greece was conducted by Gamekeepers of the Hunting Federation of Sterea Hellas and expert wild boar hunters, with the use of hounds. Fixed areas were swept twice per year, once early in the spring and once in late summer. Sampling sites occupied an average of 230 hectares (range: 25-850, 95%CI: 220-246), and were distributed throughout the study area both in latitudinal and altitudinal aspect, as well as they were located both within hunting areas and areas where hunting is not allowed. Adult and sub-adult individuals were recorded in each count along with the different habitat types where monitoring took place.

The species' mean density in Sterea Hellas was 0.048 ind/ha (range: 0.0-0.4, 95%CI: 0.04-0.05) and an average age ratio of 1.9 young/adult (range: 0-8, 95%CI: 1.7-2). Wild boar demonstrated a stable population trend during all 9 years of the study (Kruskall-Wallis chi-squared=11.73, df=8, p=0.16), a trend which was stable both within hunting areas (Kruskall-Wallis chi-squared=12.443, df=8, p=0.13) as well as within wildlife refuges (Kruskall-Wallis chi-squared=6.19, df=8, p=0.62). Wild boar density presented significantly (Wilcoxon rank-sum test: W=71286.5, p<10-6) higher densities within wildlife refuges (range: 0-0.43, mean: 0.056, 95%CI: 0.05-0.06) than in hunting areas (range: 0-0.36, mean: 0.041, 95%CI: 0.03-0.04). Nonetheless, stable population trends within both areas indicate a sustainable harvest for the species.

Adult wild boars presented similar densities between spring and summer (Wilcoxon rank-sum test: W=88928.5, p=0.8337) whereas young individuals demonstrated significantly higher densities during summer (Wilcoxon rank-sum test: W=66752, p<10-10). Although the species' density was similar between eastern and western Central Greece in total (Wilcoxon rank-sum test: W=89076, p=0.6776), wild boars demonstrated significantly higher densities in heaths and shrubs of western Greece (Wilcoxon rank-sum test: W=1604, p<10-7) whereas a reverse pattern occurred in oak or conifer forests (Wilcoxon rank-sum test: W=1989, p<10-2) and mixed forests (Wilcoxon rank-sum test: W=33148, p<10-2) with significantly higher densities in eastern Greece.

P.WW.24

Wild boar movement ecology : all what we (would need to) know

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KEYWORDS : conceptual framework ; individual ; review ; Sus scrofa

Although subject of many researches since decades, movement studies have been recently enhanced by the emergence of the movement ecology paradigm (Nathan 2008). Under this paradigm, Nathan *et al.* (2008) proposed to break down movement of animal into four basic mechanistic components : i) internal states (motivation, physiology, why to move ?), ii) motion capacities (how to move ?), iii) navigation capacities (when and where to move ?) and iv) external factors (physical environment and living organisms - conspecifics or not). Considering these four components of an individual's movement, we reviewed literature dealing with wild boar (*Sus scrofa* L.), a species of important ecological and socio-economic concern, and tried to identify the key processes influencing this species' movement. We conclude this review of the literature by highlighting the gaps in movement ecology of wild boar and suggesting further research directions under the light of the most recent used techniques.
Nathan, R. (2008). 'An emerging movement ecology paradigm.' Proceedings of the National Academy of Sciences of the United States of America 105(49) : 19050-19051.
Nathan R, Getz WM, Revilla E, Holvoak M, Kadmon R, Saltz D, Smouse PE (2008). 'A movement ecology paradigm for unifying organismal movement research.' Proceedings of the National Academy of Sciences of the United States of America 105(49) : 19052-19059.

P.WW.25

Comparing risk analyses of some potential invasive mammal species in Western Europe

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KEYWORDS : assessment ; invasive ; mammal ; risk

Threats on native flora, fauna and ecosystems due to invasive species have been widely documented throughout the world and are considered as representing major risks for indigenous species and ecosystems. Currently, a few non-native mammal species are already established in Belgium and neighboring areas. Other species are likely to establish in this area in the coming decades. The risk associated to the introduction and establishment of those mammals was quantified using a simplified scheme elaborated on the basis of the recommendations provided by the international standard for pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms, produced by the secretariat of the International Plant Protection Convention (FAO 2004). It includes two sections dedicated to risk assessment and risk management. The species that have been taken into account are : American mink (*Mustela vison*), Sika deer (*Cervus nippon*), Muntjac (*Muntiacus reevesi*), Raccoon dog (*Nyctereutes procyonoides*), and three squirrel species, Eastern gray squirrel (*Sciurus carolinensis*), Pallas's squirrel (*Callosciurus erythraeus*) and Fox squirrel (*Sciurus niger*).
Risk assessments have been performed in evaluating establishment and spread capacities of non native mammal species together with their potential impact to native species and ecosystem functions. Biodiversity impacts in terms of competition, predation or herbivory, hybridization, pathogen pollution and effects on ecosystem functions have been reviewed through existing scientific publications. Economic and social impacts have also been assessed when information was available.
Recommendations for reducing the risks to an acceptable level and mitigate non-native species damages were provided in the risk management section of the analysis. Management options were evaluated for efficacy, feasibility and impact in order to select the most appropriate. The most important pathways of introduction in Belgium were identified together with preventive and control actions. Different 'groups of species' have been identified according the kind of management recommendations that are required. For some, prohibition of organism importation and trade appears to be the best option; for others, a reinforcement of holding conditions has been pointed out; finally some species don't seem to require specific management measures.

P.WW.26

Examination of genital organs and characteristics of epididymal spermatozoa from Siberian roe deer

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KEYWORDS : Capreolus pygargus ; male genitals ; reproduction ; sperm

In order to establish some basic reproductive data of Siberian roe deer (*Capreolus pygargus*) bucks, genital tracts were collected from seven 2.5 - 8.5 years old males shot down during the mating season. The hunting areas were located in the Kurgan and Zarechnyj region (Russia). The testes and epididymides were weighed and measured and the contents of caudae epididymides (CE), vesicular glands (VG) and ampullae were collected within 2.5 - 10 h after death and the fluids analysed (volume, sperm concentration). Caudae epididymal spermatozoa were examined for motility and prepared for further morphological assessment (light and electron microscopy). The mean (± SD) weight and length of testis and VG was 31.3 g (± 4.4), 62.2 cm (± 2.5) and 29.9 cm (± 4.9), respectively. The mean (± SD) total volume (both glands) of the fluid obtained from the CE, VG and A was 0.4 ml (± 0.05), 0.2 ml (± 0.13) and 0.12 ml (± 0.14), respectively. Sperm concentration in CE-fluid varied between bucks; 6.0 to 11.4 x 109 spermatozoa / ml as well as forward motility : 50 to 80%. Similarly to the red deer and moose the sperm head of Siberian roe deer bucks was bilaterally flattened and spatulate in shape with the nucleus capped by symmetrical acrosome with the tail attached mid-basally. The frequency of sperm abnormalities, and their characteristics as determined by electron microscopy are in progress.

IUGB 2013

INTERNATIONAL ASSOCIATION FOR FALCONY AND CONSERVATION OF BIRDS OF PREY (IAF)

Falconry and Conservation - overview

Janusz Sielicki
International Association for Falconry, WARSZAWA, Poland

A set of 8 posters gives an overview of falconers' involvement in conservation worldwide.
IAF is the International Association for Falconry and Conservation of Birds of Prey. This is association of falconry clubs from almost 60 countries worldwide. IAF helps falconers to organise themselves if necessary. One of main goals is to support conservation, cultural heritage and hunting with birds of prey.
Ornithology was very close to falconry at its beginning. One of the first ornithological treaties was a part of falconry manuscript - De Arte Venandi Cum Avibus by Frederic II Hohenstaufen.
Falconers were forerunners of ornithology also in the aspect of ringing. In the early 19 century the Loo Hawking Club members used to release catch herons with metal rings inscribing the date and place of catch. Recaptures were reported. Regular ringing by ornithologists started only at the end of 19th century.
The Peregrine crisis story begun in 1940s when DDT was created, than population wenrt under severe crisis.
In 1980-1990s the numerous reintroduction projects were finished. 2009 book by Sielicki and Mizera is showing the definite improvement in the world populations except the tree-nesting population in Central Europe.
Peregrine Fund is an organization run by falconers and created in the days of the Peregrine crisis. It is still very active on global level. Species systematically released to restore wild populations include the aplomado falcon, bald eagle, bat falcon, California condor, harpy eagle, Madagascar fish eagle, Mauritius kestrel, orange-breasted falcon, prairie falcon. PF funded studies which revealed a role of diclofenac in Asian vultures crisis.
Falconers have daily contact with members of the public with whom they interact : farmers, farm labourers, pigeon fanciers etc., all have an impact on raptors, prey species and environment.
Rehabilitation center and hospitals run by falconers are present in many countries all over the world.
Falconry is inscribed as Cultural Heritage of Humanity by a number of countries led by UAE.
Traditional falconers must learn where to find birds of prey and how to catch them. The techniques may take years to learn and continue thousands of years of a sustainable tradition.
In 2010, 5000 artificial nests for Saker Falcons were erected in Mongolia, in addition to 250 nests that had been part of a five-year experimental study.
Falconry is conservation, not ony hunting

These posters will be displayed separately from the scientific posters in the foyer near the main auditorium (Room Ursus).

Private and Communal Role for Managing Wildlife and Livelihoods : the future of conservation

Delwin Benson
Colorado State University, FORT COLLINS CO, United States of America

KEYWORDS : action ; congress ; spirit ; tourism

The needs, roles, responsibilities, and spirit of private and communal sectors increase to take action for nature conservation on their lands as public lands and opportunities decrease. It is progressively difficult to protect land resources by central governments as human population pressures increase. Likewise, nature conservation must compete with other uses on private and communal lands. Barriers on the multitude of non-government land managers also increase as they must adapt to land use changes, climate variables, markets, and dilemmas of rejecting wildlife, coping with wildlife, or encouraging wildlife and nature conservation positively.

Over the next year, conservation professionals, including IUGB affiliates, can foster actions with private and communal partners. Then, outcomes can be celebrated at the **8th International Congress for Wildlife and Livelihoods on Private and Communal Lands : Livestock, Tourism, and Spirit**, to be held September 7-12, 2014 at YMCA of the Rockies in Estes Park Colorado USA. Previous Congresses were held in Africa 3 times, Canada twice, France once, and they began in New Mexico USA in 1988 entitled : 'International Wildlife Ranching Symposium' reflecting how wildlife and recreation contributes to agriculture, conservation, and economies. Our 2014 Congress emphasizes practical knowledge, skills and attitudes implemented into action outcomes for private and communal sectors internationally. We seek to improve conservation before, during and after the Congress. Models from around the world will be displayed, discussed, defended, and perhaps debated.

IUGB contributes to private and communal needs in parts of the world where human and wildlife populations are high and interactions have adapted positively together over centuries compared to other parts of the world where wildlife was eaten, fenced into parks, or fenced out. The Congress in Colorado provides a new target date, venue, and challenge to show the world how your actions can provide visions, and set new standards for cooperation, actions, and outcomes that are necessary for wildlife and human interactions into the future. We can expand the networks, motivate partnerships, organize sessions, deliver papers, promote attendance, celebrate successes, and with vision, secure a place for wildlife with people into the future. IUGB professionals and delegates are invited to :

- Make the Congress part of your plans;
- Use the date and venue as a target for new initiatives over the coming year;
- Lead a portion of the Congress;
- Deliver relevant content;
- Celebrate to show your successes; and
- Launch new initiatives.

This focus and charge for new actions into the future are not new to international conservation events. However, there is often a tendency for keynote speakers and delegates to deliver the results of their creativity, research, education, or outreach about the status quo and the more bold speakers will occasionally mention new visions. Ultimately, once delegates return home, topics and inspirations are shelved or delayed while daily routines take precedence until one is inspired again at the next conference. We have a chance over the next year to think bigger, to focus, to act, then in a year to report and to celebrate.

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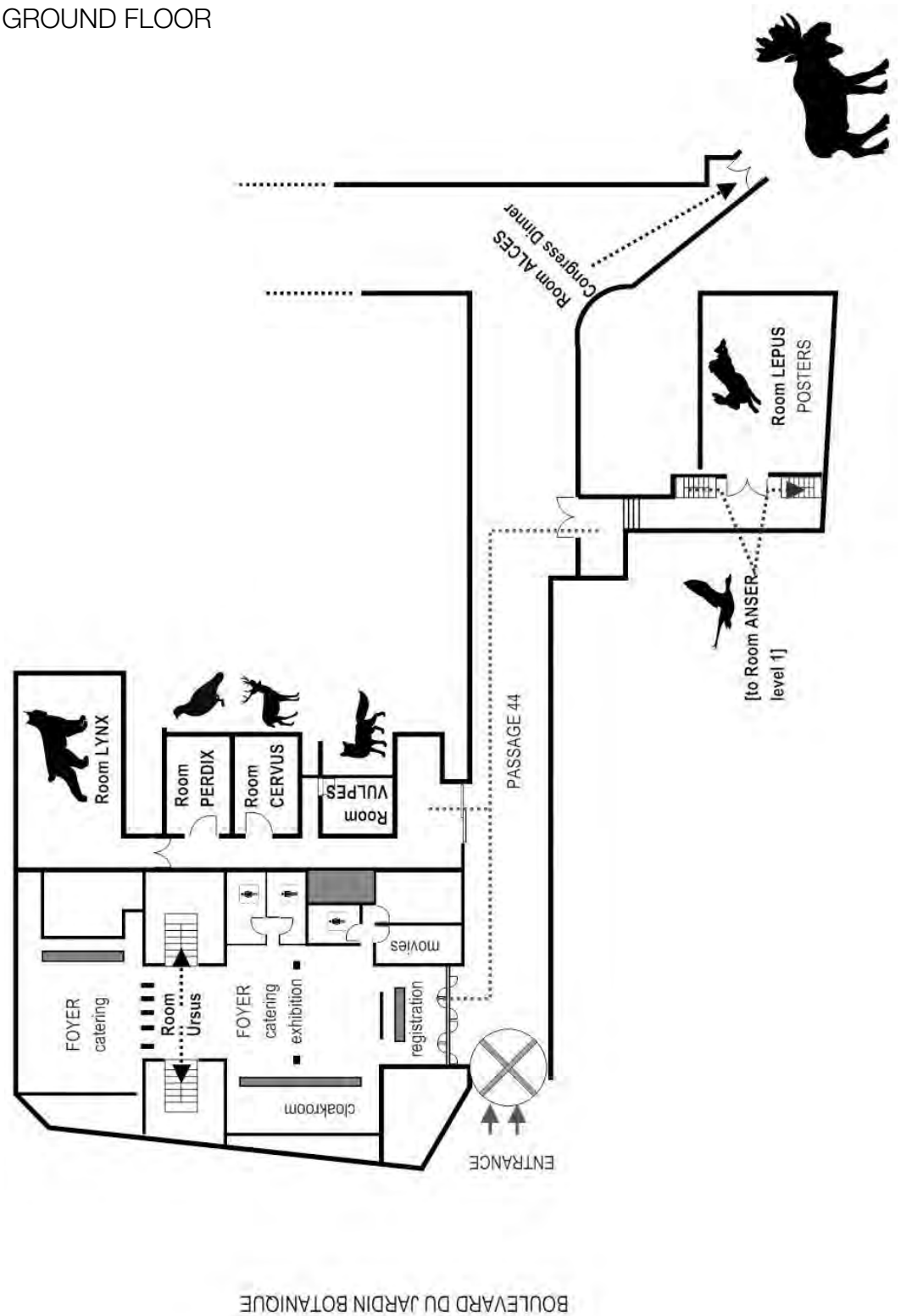

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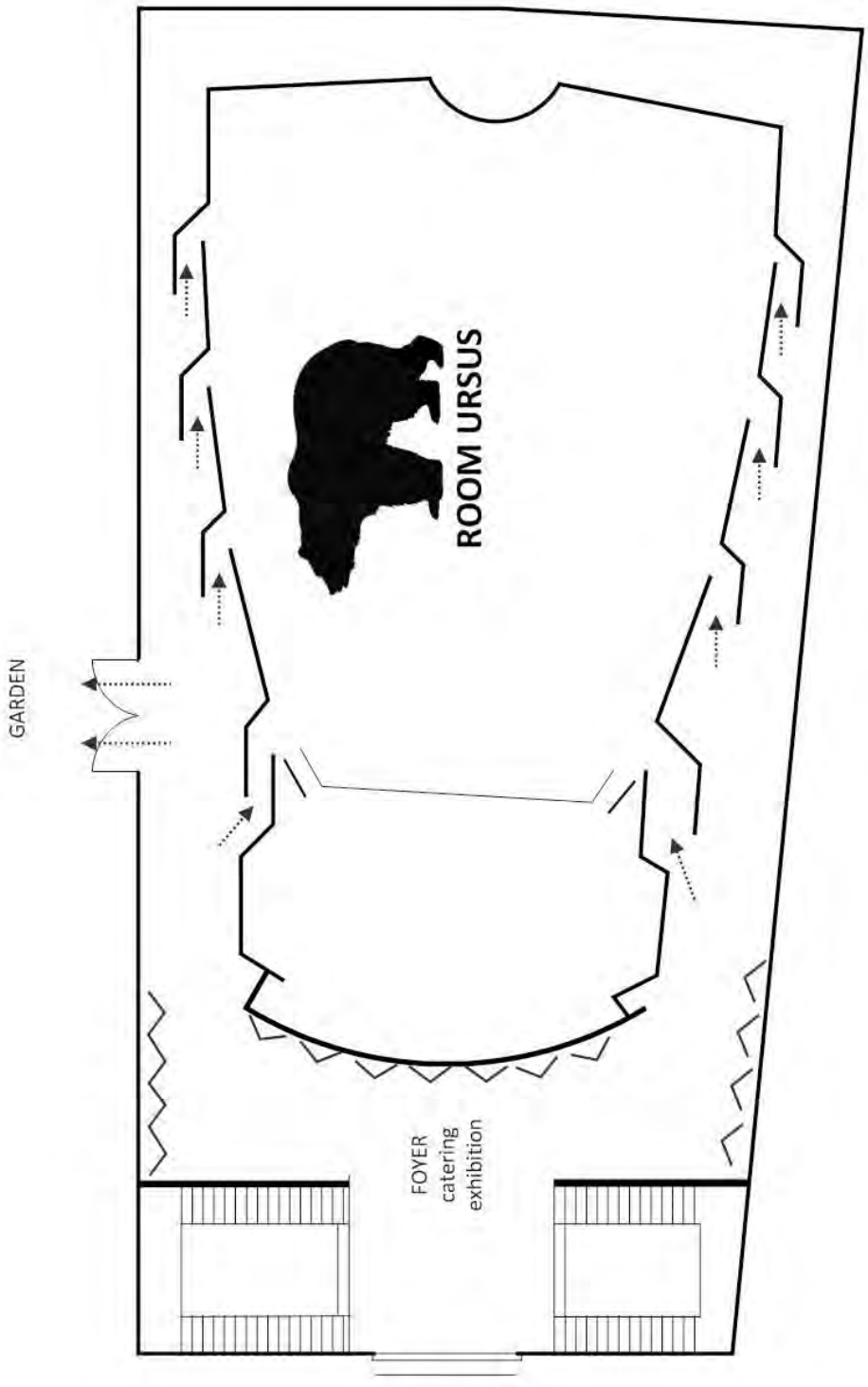

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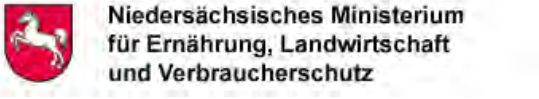
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