RAPTOR RESEARCH FOUNDATION 2009 ANNUAL CONFERENCE

Pitlochry, Scotland

29 September – 4 October 2009

CONFERENCE PROGRAMME BOOK

Major Sponsors:

Scottish Natural Heritage
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RSPB

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NIEA Northern Ireland Environment Agency
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The power of raptors

Birds of prey have a special place in Scotland.

We recognise the many benefits they bring and are committed to securing an environment in which they can flourish.

We are grateful for the research, surveys and monitoring done by members of the Scottish Raptor Study Groups, and by other researchers.

Welcome to Scotland, and enjoy what we have on offer!

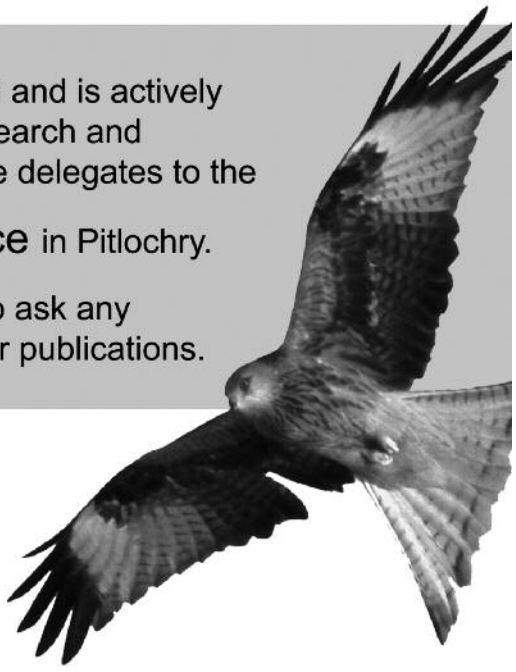
Find out more at snh.org.uk

Scottish Natural Heritage
All of nature for all of Scotland

RSPB Scotland is the BirdLife partner in Scotland and is actively involved in a wide range of raptor monitoring, research and conservation projects in this country. We welcome delegates to the

2009 Raptor Research Foundation Conference in Pitlochry.

Please come and meet our staff at our stand in the foyer to ask any questions, to learn more about our work, and to pick up our publications.



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RSPB Scotland is part of the RSPB, the UK charity that speaks out for birds and wildlife, tackling the problems that threaten our environment. Nature is amazing - help us keep it that way.

The Northern Ireland Environment Agency would like to congratulate the Raptor Research Foundation on the excellent organisational work that has been carried out, and are delighted that we have been able to assist in this international conference.

Our aim is to protect, conserve and promote the natural environment and built heritage for the benefit of present and future generations.

Northern Ireland Environment Agency: www.ni-environment.gov.uk

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Natural England is firmly committed to the conservation of all our native birds of prey and is therefore delighted to provide financial support for this important international conference.

Natural England: www.naturalengland.org.uk

WE THANK THE GENEROUS SPONSORS OF THE 2009 RRF ANNUAL CONFERENCE

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Osprey Level (£1,000 - £4,999)

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Special thanks to Keith Brockie for providing the conference logo

SCOTLAND 2009 ORGANISING COMMITTEE PERSONNEL

Ruth Tingay (Chair, Organising Committee)

Gordon Riddle (Chair, Logistics)

Malcolm Henderson (Treasurer)

Wendy Mattingley (Chair, Fieldtrips)

Phil Whitfield (Chair, Scientific Programme)

Mike McGrady (Webmaster)

Bea Arroyo (Scientific; general)

Malcolm Ogilvie (Scientific)

Francesco Germi (General)

Justin Grant (General)

Patrick Stirling-Aird (General)

George Smith (Social Events)

Chris Rollie (General)

Fieldtrip Leaders: Dave Anderson, Keith Brockie, Roy Dennis, Brian Etheridge, Justin Grant, Paul Haworth, Wendy Mattingley, Duncan Orr-Ewing, Patrick Stirling-Aird

The late Dr Jeff Watson, Roger Hayward and Dr Mike Madders made important contributions to the planning of this conference.

RAPTOR RESEARCH FOUNDATION

The Raptor Research Foundation (RRF) is a non-profit scientific society whose primary goal is the accumulation and dissemination of scientific information about raptors. This information is used to inform the public (both scientific and lay) about the role of raptors in our environment, and to promote the conservation of populations that are threatened by human activities. The RRF's membership consists of academic researchers, government agency employees and others interested in birds of prey. RRF was formed in 1966 and started publishing a scholarly journal (*The Journal of Raptor Research*) in 1967. The number of members has grown to nearly 1,000 and, even though based in the United States, it is an international organization, with ~30% of members residing in ~ 50 countries.

The RRF achieves its goals primarily through publication of research results in its quartely journal, (now available on-line through BioOne) and also holds an annual conference at which research results are presented. The RRF also makes small grants and awards to support raptor studies and to make it possible for students to attend the annual conference.

Current membership categories:

Student	$30 (£18.38; €20.98)
Regular	$43 (£26.34; €30.1)
Contributing	$50 (£30.63; €34.96)
Sustaining	$100 (£61.26; €69.92)
Life	$1000 (£613; €699)
Library/Organization	$65 (£40; €45.3)

You can join on-line via the RRF website using your credit card or alternatively, come and visit the RRF table in the vendor's area and fill in a membership form.

WEBSITE: http://raptorresearchfoundation.org

RAPTOR RESEARCH FOUNDATION PERSONNEL
* denotes attendance at Scotland 2009 conference

President: Lenny Young

Vice-President: Ted Swem*

President-Elect: Ruth Tingay*

Past President: Brian Millsap

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Secretary: Joan Morrison*

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Director North America #3: Laurie Goodrich*

Director At large #1: Jim Bednarz*

Director At large #2: Clint Boal

Director At large #3: Mike Collopy*

Director At large #4: Carol McIntyre*

Director At large #5: John Smallwood

Director At large #6: Mike Kochert*

SCOTTISH RAPTOR STUDY GROUPS

The first of the Scottish Raptor Study Groups (SRSGs) was formed almost 30 years ago, and since then the number of groups has grown to 11, covering all of mainland Scotland and most of its islands. The SRSGs comprise over 250 individual members, who monitor 14 raptor species (more than 4,000 breeding territories) each year, under special licences issued by Scottish Natural Heritage. This work is done on a voluntary basis and usually in members' own time.

SRSG members have varied backgrounds; some are professional ornithologists, others are mechanics, postoffice workers, bank clerks, lawyers, police officers, academics, business men and women, sales reps, teachers, dentists, government employees etc. All of them are committed to the protection and conservation of Scotland's raptors, with hundreds of year's worth of experience and expertise between them.

The SRSG's monitoring results are published annually as part of the Scottish Raptor Monitoring Scheme. Data collected by SRSG members are used extensively in conservation planning and have contributed towards many scientific publications.

New members are always welcome and usually serve an apprenticeship with seasoned fieldworkers to ensure best practice and high-quality fieldcraft.

WEBSITE: http://www.scottishraptorgroups.org

SCOTTISH RAPTOR STUDY GROUP PERSONNEL
* denotes attendance at Scotland 2009 conference

Chair Argyll Group: David Walker*

Chair Central Group: Patrick Sirling-Aird*

Chair Dumfries & Galloway Group: Chris Rollie*

Chair Lewis & Harris Group: Robin Reid*

Chair Highland Group: David Jardine*

Chair Lothian & Borders Group: Alan Heavisides*

Chair North East Group: Jon Hardey*

Chair Orkney Group: Jim Williamson

Chair South Strathclyde Group: Gordon Riddle*

Chair Tayside Group: Wendy Mattingley*

Chair Uists Group: Paul Boyer

Secretary: Patrick Stirling-Aird*

Webmaster: Bob McMillan*

GENERAL CONFERENCE INFORMATION

General Enquiries: The conference registration desk (in the main foyer) will be staffed most days from 08.00hrs to 18.00hrs, to help with general enquiries. A noticeboard will also be available for delegates' use (e.g. to leave messages for other delegates, to sell unwanted event tickets etc). If the registration desk is temporarily unstaffed, please ask for help at the Atholl Palace Hotel reception desk.

Name Badges: Delegates are requested to wear their name badges at all times during the day. Access to the two scientific presentation rooms is strictly limited to registered delegates only (i.e. those wearing an official name badge). Similarly, tea/coffee and the buffet lunches are only available for registered delegates – those without a name badge won't be served! We don't have any food police on duty so we ask each of you to please respect this policy (e.g. please don't get a buffet lunch for your non-paying guest because there may then not be enough refreshments for those who have paid for it). Thanks.

Oral Presenters: Please ensure your talk is pre-loaded onto the conference laptop on the evening prior to your session. The pre-loading and preview room is in the library (down the corridor opposite the Bow Lounge). If the library is locked, please find either a member of the scientific committee (Phil Whitfield, Bea Arroyo, Malcolm Ogilvie) or your session moderator (see programme for list of moderators). If you can't find any of these, please ask at the registration desk or ask a local committee member for help.

Poster Presenters: Please be available to set-up your poster at 17.30hrs on Wednesday 30th September. Presenters are expected to remain with their poster for the duration of the poster reception on Wednesday evening, as interested delegates may wish to discuss your research with you. We are able to keep posters on display in the Atholl Suite until 17.30hrs on Thursday 1st October. Please be available to remove your poster at this time.

Dress Code: There isn't a dress code for any of the conference events (scientific presentations, party at the castle, awards banquet etc). If you wish to dress up, that's fine; if you wish to dress down, that's also fine. The fashion police won't be making inspections! The only compulsory accessory is your name badge.

Fieldtrips: If you have booked onto a conference fieldtrip, please ensure you are ready to board the bus 10 minutes before departure time. This is really important! Many of our fieldtrips are on a tight schedule (e.g. because we have made bookings at distilleries, or meetings off-site with local experts, or there is a ferry to catch etc). Please also ensure you have your fieldtrip ticket available (you will find it inside your name badge pouch) and that you have warm and waterproof clothing & suitable footwear. Buses will depart from the front of the Atholl Palace hotel and your fieldtrip leader will meet you as you board. If the fieldtrip includes a packed lunch, your fieldtrip leader will have these available on the bus. If you are booked on one of the day-long fieldtrips on Sunday 4th October and you have already checked out of your hotel, a locked room will be made available at the Atholl Palace hotel for luggage storage until you return (there will only be room for day-packs on the buses, not for big suitcases!). Please ask for the room key at the Atholl Palace Hotel reception desk.

Party at the Castle: For those with a ticket to attend this event, please could you be ready to board the two buses at 19.15hrs (at the front of the Atholl Palace Hotel). The buses must depart at 19.30hrs prompt. Please remember to have your ticket available (it will be inside your name badge pouch) and also please remember to eat before we leave – food is not available at the castle. You will need money for the cash bar. For those who don't already have a ticket, if there are any available, they will be on sale at the registration desk (or see the noticeboard to find people with tickets to sell).

Awards Banquet: For those with a ticket, please make your way to the Atholl Suite for 19.15hrs prompt, and ensure you have your ticket ready (you will find it inside your name badge pouch). There will be a set meal with a vegetarian option (menu details will be available on the noticeboard at the registration desk). Ticket-holders are requested to make their menu choice known to the staff at the registration desk during the week, and no later than Friday 2nd Oct at 14.00hrs. If anyone has any special dietary needs (e.g. gluten-free etc), please also make this known by Friday so the hotel caterers can accommodate. Wine is included with dinner (4 bottles per table of ten people), and a cash bar will be open inside the Atholl Suite for anything else. For those who don't already have a ticket, if there are any available, they will be on sale at the registration desk (or see the noticeboard to find people with tickets to sell).

Vendors: Many of our sponsors have a vendor table (in the main foyer area) for the conference duration, and there are also a few commercial vendors, too. Vendors include booksellers, artists, whisky distilleries, conservation / research organisations and equipment manufacturers. Please take the time to visit.

Raffle: To help off-set the conference costs, a raffle will be held during the awards banquet on Saturday evening. Raffle tickets will be available for sale throughout the conference, and raffle prizes will be on display in the main foyer. We have some fantastic prizes, (a lot of books & whisky!), as well as other items, and we are grateful to the following donors for their generosity (accurate at time of going to press) - SecondNature Books, Buteo Books, Natural Research, RSPB, Scottish Raptor Monitoring Scheme, Argyll RSG, Dumfries & Galloway RSG, Highland RSG, Lothian & Borders RSG, Orkney RSG, South Strathclyde RSG, Tayside RSG and Uist RSG.

Hotel Bars: There are two bars in the Atholl Palace Hotel: the Stag's Head Bar (1st floor) and the Atholl Suite Bar (ground floor – inside the Atholl Suite). To avoid congestion, if one bar is busy, please try at the other one. Both bars will be open until 01.00hrs each morning, or may close earlier /later, depending on demand and at the Deputy Hotel Manager's discretion (be nice to him if you see him!).

Free Entrance to Blair Castle: Atholl Estates (home of Blair Castle) have generously offered free entrance to Blair Castle for all registered delegates for the duration of the conference. If you wish to take up this offer, please just present your name badge to the security staff at Atholl Estates.

SCHEDULE OVERVIEW TUESDAY 29 SEPTEMBER 2009

08.30 – 17.00	RRF Board Meeting (Corrie Room)
10.00 – 19.00	Registration Desk Open
10.00 – onwards	Vendor set-up
19.30 – onwards	Ice-breaker Reception† (Un-hosted, Atholl Suite, cash bar)

SCHEDULE OVERVIEW WEDNESDAY 30 SEPTEMBER 2009

08.00 – 18.00	Registration Desk Open
09.00 – 09.30	Welcome & Introduction (Atholl Suite)
09.30 – 10.30	Plenary Lecture, Prof Steve Redpath (Atholl Suite)
10.30 – 11.00	Tea/Coffee
11.00 – 12.30	Scientific Programme (Atholl Suite & Bow Lounge)
12.30 – 14.00	Lunch (Buffet for registered delegates only)
14.00 – 15.30	Scientific Programme (Atholl Suite & Bow Lounge)
15.30 – 16.00	Tea/Coffee
16.00 – 17.30	Scientific Programme (Atholl Suite & Bow Lounge)
17.30 – 18.30	Poster set-up (Atholl Suite)
18.30 – 20.00	Poster Reception† (Atholl Suite)

SCHEDULE OVERVIEW THURSDAY 1 OCTOBER 2009

06.00 – 12.00	Local Wildlife & Habitat Fieldtrip‡ (Coach departs 06.00hrs prompt!)
08.00 – 18.00	Registration Desk Open
09.00 – 10.30	Scientific Programme (Atholl Suite & Bow Lounge)
10.30 – 11.00	Tea/Coffee
11.00 – 12.30	Scientific Programme (Atholl Suite & Bow Lounge)

12.30 – 14.00 Lunch (Buffet for registered delegates only)

14.00 – 15.30 Scientific Programme (Atholl Suite & Bow Lounge)

15.30 – 16.00 Tea/Coffee

16.00 – 17.30 Scientific Programme (Atholl Suite & Bow Lounge)

19.30 – 23.45 Party at the Castle[§] (Coaches depart 19.30hrs prompt!)

SCHEDULE OVERVIEW FRIDAY 2 OCTOBER 2009

08.00 – 18.00 Registration Desk Open

09.00 – 10.30 Scientific Programme (Atholl Suite & Bow Lounge)

10.30 – 11.00 Tea/Coffee

11.00 – 12.30 Scientific Programme (Atholl Suite & Bow Lounge)

12.30 – 14.00 Lunch (Buffet for registered delegates only)

13.00 – 18.30 Whisky Fieldtrip[§] (Coach departs 13.00hrs prompt!)

14.00 – 15.30 Scientific Programme (Atholl Suite & Bow Lounge)

15.30 – 16.00 Tea/Coffee

16.00 – 17.30 Scientific Programme (Atholl Suite & Bow Lounge)

19.00 – 19.30 Book Launch[†] – *Raptors: A Fieldguide for Surveys & Monitoring* (second, expanded edition), and acknowledgement of outstanding contributions of fieldworkers (Atholl Suite).

19.30 – 20.30 Scotland's Wildlife & Landscapes[†] by Roy Dennis (Atholl Suite)

SCHEDULE OVERVIEW SATURDAY 3 OCTOBER 2009

08.00 – 12.30 Registration Desk Open

08.00 – 08.50 RRF AGM (Bow Lounge, all welcome)

09.00 – 10.30 Scientific Programme (Atholl Suite & Bow Lounge)

10.30 – 11.00 Tea/Coffee

11.00 – 12.30	Scientific Programme (Atholl Suite & Bow Lounge)
12.30 – 14.00	Lunch (Buffet for registered delegates only)
13.00 – 18.30	Whisky Fieldtrip[§] (Coaches depart 13.00hrs prompt!)
13.00 – 18.30	Ben Vrackie Hillwalk[†] (depart from front car-park 13.00hrs prompt!)
13.00 – 18.00	Atholl Estate Fieldtrip[§] (LandRovers depart 13.00hrs prompt!)
19.15 – 22.00	Awards Banquet[§] (Atholl Suite)

SCHEDULE OVERVIEW SUNDAY 4 OCTOBER 2009

08.30	Mull Fieldtrip[§] – must leave on time to catch ferry in Oban
09.30 – 16.30	Atholl Estate Fieldtrip[§]
09.30 – 18.00	Central Scotland Fieldtrip[§]
09.30 – 18.00	Historical Perthshire Fieldtrip[§]
09.30 – 19.00	Speyside & Cairngorms Fieldtrip[§]
09.30 – 18.00	East Scotland Fieldtrip[§]

[†]Free event for registered delegates

[§]Ticket-only event

If available, spare tickets for each event/fieldtrip will be on sale at the registration desk during the week. Delegates wishing to sell a pre-purchased ticket for any event are encouraged to post the info on the noticeboard next to the registration desk.

REGISTERED DELEGATES (at time of going to press)

NAME	AFFILIATION
Mr Kees Aerts	National Working Group for Birds of Prey, NETHERLANDS
Mr Ernesto Alvarez	GREFA, SPAIN
Dr Arjun Amar	RSPB, SCOTLAND
Mr Rule Anderson	Raptor Study Group, SCOTLAND
Mr David Anderson	Forestry Commission, SCOTLAND
Mr Mark Anderson	BirdLife, SOUTH AFRICA
Mrs Arianna Aradis	Agency for Environment Protection, ITALY
Dr Gonzalo Munoz Arroyo	Fundacion Migres, SPAIN
Dr Bea Arroyo	Instituto de Investigacion en Recursos Cinegeticos, SPAIN
Ms Elsie Ashworth	Raptor Study Group, SCOTLAND
Mr Miroslav Babushkin	Moscow State Pedagogical University, RUSSIA
Mr Christopher Baker	Raptor Study Group, SCOTLAND
Mr Jack Barclay	Albion Environmental Inc., USA
Ms Lina Bardo	McGill University, CANADA
Mr Joe Barnes	University of Nevada Las Vegas, USA
Mr Luis Barrios	Fundacion Migres, SPAIN
Dr Marc Bechard	Boise State University, USA
Dr Jim Bednarz	Arkansas State University, USA
Mr Harry Bell	Raptor Study Group, SCOTLAND
Dr James Belthoff	Boise State University, USA
Mr Stuart Benn	Raptor Study Group, SCOTLAND
Dr Pat Benson	University of the Witwatersrand, SOUTH AFRICA
Mr Stephen Bentall	ENGLAND
Dr Rob Bierregaard	University of North Carolina, USA
Dr Keith Bildstein	Hawk Mountain Sanctuary, USA
Dr David Bird	McGill University, CANADA
Mr Hein Bloem	NETHERLANDS
Mr Pete Bloom	University of Idaho, USA
Dr Petra Bohall Wood	US Geological Survey, USA
Dr Vasileios Bontzorlos	University of Salamanca, SPAIN
Mr Travis Booms	Alaska Department of Fish & Game, USA
Dr Gary Bortolotti	University of Saskatchewan, CANADA
Mr Rafel Bosch	University of Barcelona, SPAIN
Mr Chris Bowden	RSPB, ENGLAND
Dr Bill Bowerman	Clemson University, USA
Ms Mary Bowerman	Clemson University, USA
Dr David Brandes	Lafayette College, USA
Dr Vincent Bretagnolle	Centre d'etudes Biologiques de Chize, FRANCE
Mr Christopher Briggs	University of Nevada Reno, USA
Mr Keith Brockie	Raptor Study Group, SCOTLAND
Ms Jessi Brown	University of Nevada Reno, USA
Dr Javier Bustamante	Estacion Biologica de Donana, SPAIN
Mr Duncan Cameron	Raptor Study Group, SCOTLAND
Ms Julia Camp	USA
Ms Laura Cardador	University of Barcelona, SPAIN
Mr Ian Carter	Natural England, ENGLAND
Mr Anand Chaudhary	Bird Conservation Nepal, NEPAL
Mr Damian Clarke	Golden Eagle Trust, REPUBLIC of IRELAND
Dr Nigel Collar	Birdlife International, ENGLAND
Mr Douglas Collister	Accipiter Ecological Management, CANADA

Dr Mike Collopy	University of Nevada Reno, USA
Mrs Kathy Collopy	USA
Ms Camille Concepcion	Philippine Eagle Foundation, PHILIPPINES
Ms Ana Cordeiro	Bio 3, PORTUGAL
Dr Thomas Cornulier	Centre d'etudes Biologiques de Chize, FRANCE
Mr Sergio Couto	Gypaetus Foundation, SPAIN
Mr Jim Craib	Raptor Study Group, SCOTLAND
Mr Derek Craighead	Craighead Beringia South, USA
Mr David Crawford	Compliance Biology Inc., USA
Mr Fergus Crystal	Accion por el Mundo Salvaje, SPAIN
Dr Davide Csermely	University of Parma, ITALY
Mr Espen Lie Dahl	Nowegian Institute for Nature Research, NORWAY
Dr Rob Davies	West Wales Biodiversity Information Centre, WALES
Mr Roy Dennis	Highland Foundation for Wildlife, SCOTLAND
Mrs Sue Dewar	Scottish Raptor Study Group, SCOTLAND
Mrs Andreia Dias	Centro de Estudos de Avifauna Iberica, PORTUGAL
Mr Ron Downing	Raptor Study Group, SCOTLAND
Mr Kevin Duffy	Natural Research, SCOTLAND
Mr James Dwyer	Virginia Tech, USA
Dr Cheryl Dykstra	Raptor Environmental, USA
Mr Bob Elliot	RSPB, SCOTLAND
Mr Brian Etheridge	Raptor Study Group, SCOTLAND
Mr Richard Evans	RSPB, SCOTLAND
Ms Ulla Falkdalen	Swedish Ornithological Society, SWEDEN
Mr Dario Fernandez Bellon	The Peregrine Fund, DOMINICAN REPUBLIC
Dr Laura Fasce	ITALY
Ms Rita Ferreira	Bio 3, PORTUGAL
Dr Miguel Ferrer	Estacion Biologica de Donana, SPAIN
Dr Ondine Filippi-Codaccioni	National Museum of Natural History, FRANCE
Mr Graeme Findlay	Forestry Commission, SCOTLAND
Ms Sally Fisher	RSPB, SCOTLAND
Mr Alv Ottar Folkestad	Norwegian Ornithological Society, NORWAY
Mr Andrew Forde	Forde Bio, USA
Dr Jim Fraser	Virginia Tech, USA
Ms Katy Freeman	Forestry Commission, SCOTLAND
Dr Marcel Gahbauer	Migration Research Foundation, CANADA
Mr Marc Galvez	Generalitat de Catalunya, SPAIN
Dr Anita Gamauf	Vienna Museum of Natural History, AUSTRIA
Mr David Garcelon	Institute for Wildlife Studies, USA
Mr Francesco Germi	EGYPT
Mr Paul Gill	Environmentally Sustainable Systems, SCOTLAND
Ms Laurie Goodrich	Hawk Mountain Sanctuary, USA
Mr Ronnie Graham	Raptor Study Group, SCOTLAND
Mr Justin Grant	Raptor Study Group, SCOTLAND
Mr Rupert Griffiths	ENGLAND
Mr Teryl Grubb	U.S Forest Service, USA
Dr Marion Gschweng	University of Ulm, GERMANY
Mr Thomas Gunkorn	BioConsult SH, GERMANY
Mr Jose Gutierrez Urena	Gypaetus Foundation, SPAIN
Mr Jan-Eric Hagerroth	Golden Eagle Group, SWEDEN
Mr Allen Hale	Buteo Books, USA
Dr Duncan Halley	Norwegian Institute for Nature Research, NORWAY
Mr Ray Hander	US Fish & Wildlife Service, USA

Mr Jon Hardey	Raptor Study Group, SCOTLAND
Mr Niall Harmey	Raptor Study Group, REPUBLIC of IRELAND
Ms Margriet Harms	Fundacion Migres, SPAIN
Mr Rick Harness	EDM International Inc., USA
Dr Paul Haworth	Haworth Conservation, SCOTLAND
Mr Alan Heavisides	Raptor Study Group, SCOTLAND
Dr Bjorn Helander	Swedish Museum of Natural History, SWEDEN
Mr Malcolm Henderson	Raptor Study Group, SCOTLAND
Dr Chuck Henny	US Geological Survey, USA
Dr Antonio Hernandez-Matias	University of Barcelona, SPAIN
Mr Brent Hetzler	National Parks Service, USA
Dr Will Hoppitt	University St Andrews, SCOTLAND
Dr Birger Hornfeldt	Umea University, SWEDEN
Mr Stuart Housden	RSPB, SCOTLAND
Ms Etta Hui	HONG KONG
Mr Hiromichi Ichinose	Asian Raptor Research & Conservation Network, JAPAN
Mr Takehiko Inoue	Society for Golden Eagle Research, JAPAN
Ms Bronwyn Issac	Deakin University, AUSTRALIA
Mr Karl-Otto Jacobsen	Norwegian Institute for Nature Research, NORWAY
Mr Simon James	ENGLAND
Mr David Jardine	Raptor Study Group, SCOTLAND
Mrs Barbara Jenny	The Peregrine Fund, USA
Mr Pete Jenny	The Peregrine Fund, USA
Ms Rikke Jensen	University of Copenhagen, DENMARK
Ms Emily Joachim	University of Reading, ENGLAND
Dr Jeff Johnson	University of North Texas, USA
Mr Denis Johnstone	SCOTLAND
Dr Pranay Rao Juvvadi	Raptor Conservation Foundation, INDIA
Dr Todd Katzner	National Aviary, USA
Ms Cindy Kemper	Alberta Fish & Wildlife, CANADA
Dr Norbert Kenntner	Institute for Zoo and Wildlife Research, GERMANY
Dr Robert Kenward	ENGLAND
Ms Kristen Keyes	McGill University, CANADA
Mr Lloyd Kiff	The Peregrine Fund, USA
Ms Amy King	ENGLAND
Mr Jeff Knott	RSPB, ENGLAND
Mr Mike Kochert	USGS Snake River Field Station, USA
Mr Kenny Kortland	Forestry Commission, SCOTLAND
Dr Oliver Krone	Leibniz Institute for Zoo & Wildlife Research, GERMANY
Mr Ralph Kruger	Landesbund fur Vogelschutz, GERMANY
Mr Kulojyoti Lahkar	Bombay Natural History Society, INDIA
Dr Rowena Langston	RSPB, ENGLAND
Mr Michael Lanzone	Carnegie Museum of Natural History, USA
Ms Fiona Leckie	Natural Research, SCOTLAND
Mrs Debbra Lehman	USA
Mr Robert Lehman	US Geological Survey, USA
Mr Roy Leigh	Avian Ecology, ENGLAND
Ms Jenny Lennon	RSPB, SCOTLAND
Mr Tony Lightley	Forestry Commission, SCOTLAND
Mr Brian Little	Northumbria Raptor Group, ENGLAND
Ms Lidia Lopez	Estacion Biologica de Donana, SPAIN
Dr Michel Louette	Royal Museum for Central Africa, BELGIUM
Mr Rui Lourenco	Universidade de Evora, PORTUGAL

Mr John Lusby	BirdWatch Ireland, REPUBLIC of IRELAND
Mrs Liz Macdonald	Raptor Study Group, SCOTLAND
Dr Alison MacLennan	RSPB, SCOTLAND
Mr Charles Maisonneuve	Ministere des Ressources Naturelles et de la Faune, CANADA
Dr Santi Manosa	University of Barcelona, SPAIN
Mr Mark Martell	Audubon Minnesota, USA
Mrs Wendy Mattingley	Raptor Study Group, SCOTLAND
Dr Angela Matz	US Fish & Wildlife Service, USA
Dr Aly McCluskie	RSPB, SCOTLAND
Dr Mike McGrady	Natural Research, AUSTRIA
Dr Carol McIntyre	National Parks Service, USA
Mr Bob McMillan	Raptor Study Group, SCOTLAND
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Dr Allan Mee	Golden Eagle Trust, REPUBLIC of IRELAND
Mr Eric Meek	RSPB, SCOTLAND
Dr Bernd Meyburg	World Working Group for Birds of Prey & Owls, GERMANY
Dr Kay Millar	HawkWatch International, USA
Mr Stewart Miller	Raptor World, SCOTLAND
Ms Tricia Miller	Pennsylvania State University, USA
Mr Yoshifumi Morooka	JAPAN
Dr Joan Morrison	Trinity College, USA
Mr Edward Moss	Umea University, SWEDEN
Dr Francis Mougeot	Instituto de Investigacion en Recursos Cinegeticos, SPAIN
Mr Tatsuyoshi Murate	Asian Raptor Research & Conservation Network, JAPAN
Mr Campbell Murn	Hawk Conservancy Trust, ENGLAND
Dr Juan Negro	Spanish Council for Scientific Research, SPAIN
Dr Wayne Nelson	CANADA
Dr Ian Newton	Centre for Ecology & Hydrology, ENGLAND
Ms Chris Niemela	Chrysalis Biological, USA
Dr Gerald Niemi	University of Minnesota, USA
Dr Therese Nore	Universite de Limoges, FRANCE
Mr Peter Nye	NY State Department of Environmental Conservation, USA
Dr Torgeir Nygard	Norwegian Institute for Nature Research, NORWAY
Ms Irene O'Brien	Raptor Study Group, REPUBLIC of IRELAND
Mr Barry O'Donaghue	National Parks & Wildlife Service, REPUBLIC of IRELAND
Dr Guenter Oehme	Martin Luther University of Halle, GERMANY
Dr Malcolm Ogilvie	Raptor Study Group, SCOTLAND
Ms Lorenza Olivares	Gypaetus Foundation, SPAIN
Mr Jack Orchel	Galloway Nature & Heritage Trust, SCOTLAND
Mr Duncan Orr-Ewing	RSPB, SCOTLAND
Mr Lorcan O'Toole	Golden Eagle Trust, REPUBLIC of IRELAND
Mrs Tomoko Ozawa	Asian Raptor Research & Conservation Network, JAPAN
Mr Toshiki Ozawa	Society for Golden Eagle Research, JAPAN
Dr Luis Palma	Universidade do Algarve, PORTUGAL
Dr Massimo Pandolfi	University of Urbino, ITALY
Mrs Jemima Parry-Jones	International Centre for Birds of Prey, ENGLAND
Mr David Payer	US Fish & Wildlife Service, USA
Mr Mariano Pedregosa	Gypaetus Foundation, SPAIN
Ms Natasha Peters	USA
Mr Antonio Pinilla	Accion por el Mundo Salvaje, SPAIN
Mr Adrien Pinot	CEBC-CNRS, FRANCE
Dr Eugene Potapov	Bryn Athyn College, USA
Mrs Anne Price	Raptor Education Foundation, USA

Dr Vasilij Ptschelinzev	JSC EcoProject, RUSSIA
Dr Joan Real	University of Barcelona, SPAIN
Dr Graham Rebecca	Raptor Study Group, SCOTLAND
Dr Steve Redpath	University of Aberdeen, SCOTLAND
Ms Stephanie Rehkuh	SCOTLAND
Mr Robin Reid	Raptor Study Group, SCOTLAND
Mr Jamie Resano	University of Barcelona, SPAIN
Mr Gordon Riddle	Raptor Study Group, SCOTLAND
Dr Helen Riley	Scottish Raptor Monitoring Scheme, SCOTLAND
Mr Robert Ritchie	USA
Mr Chris Rollie	RSPB, SCOTLAND
Dr Staffan Roos	British Trust for Ornithology, SCOTLAND
Dr Nick Rossiter	ENGLAND
Dr Marc Ruddock	Natural Reserch, NORTHERN IRELAND
Mr Carlos Ruiz	Gypaetus Foundation, SPAIN
Dr Miguel Saggese	College of Veterinary Medicine, Western University, USA
Dr Rex Sallabanks	Idaho Fish & Game, USA
Mr Gary Santolo	CH2M HILL, USA
Mr Aleix Millet Sargatal	Fundacio Caixa Catalunya, SPAIN
Mr Richard Saunders	Natural England, ENGLAND
Mr Stefan Schindler	University of Vienna, AUSTRIA
Mr Gunnar Sein	State Nature Conservation Centre, ESTONIA
Ms Cristina Sellares	Parc Natural del Garraf, SPAIN
Dr Fabrizio Sergio	Estacion Biologica de Donana, SPAIN
Dr Lucia Severinghaus	Biodiversity Research Center, Academia Sincia, TAIWAN
Dr Sheldon Severinghaus	USA
Mr Jevgeni Shergalin	International Wildlife Consultants Ltd, WALES
Dr Jill Shephard	Royal Zoological Society of Antwerp, BELGIUM
Dr James Sikarskie	Michigan State University College of Veterinary Medicine, USA
Mr John Simpson	Raptor Study School, SCOTLAND
Dr Jennifer Smart	RSPB, ENGLAND
Mr George Smith	Raptor Study Group, SCOTLAND
Ms Claire Smith	RSPB, SCOTLAND
Dr Jeff Smith	HawkWatch International, USA
Ms Zoe Smith	ENGLAND
Mr David Sowter	ENGLAND
Ms Jennifer Speers	HawkWatch International, USA
Mr Ronny Steen	Norwegian University of Life Sciences, NORWAY
Ms Karen Steenhof	Owyhee Desert Studies, USA
Ms Audrey Sternalski	Centre d'etudes Biologiques de Chize, FRANCE
Mr Andrew Stevenson	Scottish Natural Heritage, SCOTLAND
Mr Andrew Stewart	CANADA
Mr Patrick Stirling-Aird	Raptor Study Group, SCOTLAND
Mr Marten Stoffel	University of Saskatchewan, CANADA
Dr Peter Sunde	National Environmental Institute, Aarhus University, DENMARK
Mr Ted Swem	US Fish & Wildlife Service, USA
Mr Alessandro Tanferna	Estacion Biologica de Donana, SPAIN
Dr Luis Tapia	University of Santiago de Compostela, SPAIN
Mr Julien Terraube	University of Castilla-la-Mancha, CSIC, SPAIN
Dr Emma Teuten	RSPB, SCOTLAND
Dr Des Thompson	Scottish Natural Heritage, SCOTLAND
Mr Michael Thornton	Raptor Study Group, SCOTLAND
Mr Niall Tierney	BirdWatch Ireland, REPUBLIC of IRELAND

Mr Hank Timm	US Fish & Wildlife Service, USA
Dr Ruth Tingay	Natural Research, SCOTLAND
Dr Albert Tinto	University of Barcelona, SPAIN
Dr Josep Ramon Torrento	Diputacio de Barcelona, SPAIN
Mr Junior Tremblay	Ministere des Ressources Naturelles et de la Faune, CANADA
Mr Jean-Paul Urcun	LPO Aquitaine, FRANCE
Dr Irina Utekhina	Magadan Zapovednik, RUSSIA
Dr Ulo Vali	Estonian University of Life Sciences, ESTONIA
Mr Dimitris Vasilakis	WWF, GREECE
Mr Jeroen Veldman	NETHERLANDS
Dr Francisco Vilella	Mississippi State University, USA
Mr Alexandre Villers	Centre d'etudes Biologiques de Chize, FRANCE
Dr Munir Virani	The Peregrine Fund, KENYA
Mr David Walker	Raptor Study Group, SCOTLAND
Dr Sean Walls	Biotrack Ltd, ENGLAND
Mr Gregor Watson	Environment & Heritage Service, NORTHERN IRELAND
Mrs Vanessa Watson	Raptor Study Group, SCOTLAND
Dr Rick Watson	The Peregrine Fund, USA
Dr Chris Wernham	British Trust for Ornithology, SCOTLAND
Mr Ewan Weston	Natural Research, SCOTLAND
Dr Clayton White	Brigham Young University, USA
Dr Phil Whitfield	Natural Research, SCOTLAND
Mr Nick Williams	DEFRA, ENGLAND
Mr Matt Wilson	Raptor Study Group, SCOTLAND
Dr Mark Wilson	University College Cork, REPUBLIC of IRELAND
Ms Elizabeth Wommack	University of California, Berkeley, USA
Mr Richard Wood	Raptor Study Group, SCOTLAND
Mr Ritsuo Yamada	Society for Golden Eagle Researc, JAPAN
Mrs Atsuko Yamazaki	Asian Raptor Research & Conservation Network, JAPAN
Mr Toru Yamazaki	Asian Raptor Research & Conservation Network, JAPAN
Dr Reuven Yosef	Birding & Research Centre Eilat, ISRAEL

SCIENTIFIC PROGRAMME

PRESENTATION SCHEDULES

*denotes competing for student presentation award

Wednesday 30 September 2009

Atholl Suite

09:00 – 09:30	Introduction and welcome
09:30 – 10:30	Plenary Lecture – **S. REDPATH**
Coffee & Tea	
	General session 1 (Moderator: Gary Bortolotti)
11:00 – 11:30	**C. MURN**, M.D. ANDERSON. Behaviour of African White-backed Vultures (*Gyps africanus*) in Relation to Land-use and Food Availability
11:30 – 12:00	**P. C. BENSON**. Cape Vulture Reproductive Activities at the Kransberg Colony, South Africa – a 28 Year Retrospective
12:00 – 12:30	S. GOMBOBAATAR et al. The Ground Nesting Raptors on the Mongolian Steppe [Presenter: R. Yosef]
Lunch	
	General session 2 (Moderator: Vincent Bretagnolle)
14:00 – 14:30	**G. M. ARROYO** et al. Preliminary Results on Spring Migration of Raptors Across the Straits of Gibraltar
14:30 – 15:00	***M. LANZONE** et al. Development of a High Frequency GSM Telemetry Device for Tracking Raptors
15:00 – 15:30	**D. BRANDES** et al. Simulation of Golden Eagle (*Aquila chrysaetos*) Migration Pathways Through the Central Appalachians
Coffee & Tea	
	General session 3 (Moderator: Todd Katzner)
16:00 – 16:30	**A. HERNÁNDEZ-MATÍAS** et al. Population Viability Analysis of the Bonelli's Eagle: Modeling the Whole Western European Metapopulation
16:30 – 17:00	**D. J. HALLEY** et al. Domestic Reindeer in the Diet of Breeding Golden Eagles in the Calving Season in Finnmark, Norway as Determined by Stable Isotope Analysis
17:00 – 17:30	**K. STEENHOF**, J.A. HEATH. Demography of an American Kestrel (*Falco sparverius*) Population
17:30 – 18:30	**Poster setup**
18.30 – 20.00	**Poster Reception (Atholl Suite)**

Wednesday 30 September 2009

Bow Lounge

09:00 – 10:30 No talks

Coffee & Tea

Scotland session 1 (Moderator: Ian Newton)

11:00 – 11:30 **M. MCGRADY**, G. SMITH. Using PIT Technology to Study Peregrine Demography

11:30 – 12:00 **D. P. WHITFIELD** et al. A Conservation Framework for the Golden Eagle in Scotland

12:00 – 12:30 **R. E. TINGAY** et al. Using DNA to Monitor Turnover and Survival of Golden Eagles (*Aquila chrysaetos*) in Scotland

Lunch

Scotland session 2 (Moderator: Malcolm Ogilvie)

14:00 – 14:30 **R. J. EVANS** et al. Do White-tailed Eagles *Haliaeetus albicilla* Compete with Golden Eagles *Aquila chrysaetos* in Scotland?

14:30 – 15:00 **B. ELLIOT**. Raptor Crime in Scotland. A History of RSPB Investigation

15:00 – 15:30 **A. AMAR** et al. Population Dynamics of Orkney Hen Harriers: Data from over 50 years of Monitoring

Coffee & Tea

General session 4 (Moderator: Marcel Gahbauer)

16:00 – 16:30 **R. O. BIERREGAARD**, **JR.,** M.S. MARTELL. Migration and Wintering Behaviour of Juvenile Ospreys (*Pandion haliaetus*) as Determined by Satellite Telemetry

16:30 – 17:00 **P. H. BLOOM** et al. Unusual Summer Initiated, Long Distance, Northbound Migration of Non-breeding Red-tailed Hawks from Southwestern California

17:00 – 17:30 **J. P. SMITH**. Movement Dynamics of Golden Eagles in Western North America as Determined by Satellite Tracking

18.30 – 20.00 **Poster Reception (Atholl Suite)**

Thursday 1 October 2009

Atholl Suite

General session 5 (Moderator: Mike Collopy)

09:00 – 09:30 ***A. STERNALSKI** et al. Mechanisms and Functions of Carotenoid and UV Colouration in Nestling Montagu's Harriers (*Circus pygargus*)

09:30 – 10:00 **V. A. BONTZORLOS** et al. Barn Owl Feeding Habits in Mediterranean Agroecosystems of Central Greece. Spatial and Temporal Diet Patterns

10:00 – 10:30 ***J. F. DWYER** et al. Why do Non-breeding Crested Caracaras in Florida form Groups?

Coffee & Tea

General session 6 (Moderator: Duncan Halley)

11:00 – 11:30 **C. SELLARES DE PEDRO**, R.DEL AMO AGUILAR. Nest Cameras as a Tool for Habitat and Population Management of Bonelli's Eagle (*Aquila fasciata*)

11:30 – 12:00 **A. TINTÓ** et al. Modeling the Electrocution Risk of Raptors in Powerlines and Evaluating Mortality Rates at Corrected Pylons

12:00 – 12:30 **R. N. LEHMAN** et al. Raptor Electrocution Rates for a Utility in the Intermountain Western U.S.A.

Lunch

General session 7 (Moderator: Laurie Goodrich)

14:00 – 14:30 **L. CARDADOR** et al. Marsh Harrier (*Circus aeruginosus*) Foraging Habitat Preferences within Agricultural Landscapes

14:30 – 15:00 ***A. STERNALSKI**, V. BRETAGNOLLE. Communal Roosting Recruitment in Marsh Harrier (*Circus aeruginosus*): Mechanisms and Individual Investment

15:00 – 15:30 ***J. TERRAUBE** et al. Diet Specialisation and Foraging Efficiency Under Fluctuating Food Abundance in Sympatric Harriers

Coffee & Tea

General session 8 (Moderator: Torgeir Nygard)

16:00 – 16:30 **O. KRONE**. Lead Poisoning in White-tailed Sea Eagles (*Haliaeetus albicilla*) – How to Solve the Problem

16:30 – 17:00 **L. PALMA** et al. An Exception to the Rule: The Fast Growing Tree-nesting Bonelli's Eagle (*Aquila fasciata*) Population of Southern Portugal

17:00 – 17:30 ***T. L. BOOMS** et al. Gyrfalcon (*Falco rusticolus*) Dispersal and Site Fidelity in western Alaska, USA

Thursday 1 October 2009

Bow Lounge

Persecution session 1 (Moderator: Phil Whitfield)

09:00 – 09:30 **S. COUTO** et al. Illegal Poisoning Trends, Crime-Fighting and Impacts on Vultures in Andalusia, S Spain: LIFE NAT/ES/000056

09:30 – 10:00 **K. LAHKAR**, A.U. CHOUDHURY. Persecution of Two Species of Critically Endangered *Gyps* Vultures in Assam, India

10:00 – 10:30 **J. SMART** et al. Red Kites in Scotland: Flying in the Face of Persecution?

Coffee & Tea

Migration & Wintering session 1 (Moderator: Fabrizio Sergio)

11:00 – 11:30 **C. L. McINTYRE** et al. Movement Patterns of Long-distance Migratory Subadult Golden Eagles (*Aquila chrysaetos*) in Consecutive Years

11:30 – 12:00 **F. MOUGEOT** et al. Wintering and Dispersal Strategies of Pallid Harriers (*Circus macrourus*) Evaluated from Satellite Tracking

12:00 – 12:30 **M. LOUETTE**. Molt of Honey-buzzard (*Pernis apivorus*) in Africa

Lunch

Migration & Wintering session 2 (Moderator: Miguel Ferrer)

14:00 – 14:30 **B.-U. MEYBURG**, C. MEYBURG. Satellite Tracking of Migrating and Wintering Eastern Imperial Eagles (*Aquila heliaca*)

14:30 – 15:00 **R. YOSEF**, H. SMIT. Population Trends of Steppe Eagle (*Aquila nipalensis*) at Eilat, Israel– a Cause for Concern

15:00 – 15:30 **J.-P. URCUN**, O. FILIPPI-CODACCIONI. Using Long-term Surveys of Raptor migration in the French Pyrenees as an Indicator of Global Climatic Change: First Results

Coffee & Tea

Migration & Wintering session 3 (Moderator: Keith Bildstein)

16:00 – 16:30 *__S. SCHINDLER__ et al. Systematic Monitoring of Spring Raptor Migration at Dadia National Park, Greece, from 2003 to 2005

16:30 – 17:00 **L. BARRIOS** et al. Results of a 10 Year Raptor-Migration Monitoring Survey in the Straits of Gibraltar

17:00 – 17:30 **J. P. SMITH** et al. Raptor Population Index Project: A Model for Continental Coordination of Raptor Migration Monitoring

Friday 2 October 2009

Atholl Suite

General session 9 (Moderator: Carol McIntyre)

09:00 – 09:30 **T. E. KATZNER** et al. Reassessing Determinants of Offspring Sex Ratio Variation of Sexually-Dimorphic, Long-lived Vertebrates: Stochastic Variation or Threshold-based Mechanisms?

09:30 – 10:00 **B. ARROYO** et al. Home Range Sizes and Foraging Habitat Selection in the Montagu´s Harrier (*Circus pygargus*): Implications for Conservation Management

10:00 – 10:30 *__J. L. BROWN__ et al. Comparing Reproduction of Three Raptor Species with Logistic Exposure Models

Coffee & Tea

General session 10 (Moderator: Bernd Meyburg)

11:00 – 11:30 ***B. ISAAC** et al. Presence Only Modelling: Predicting Habitat Suitability for a Rare Raptor in South-east Australia

11:30 – 12:00 ***C. W. BRIGGS** et al. Testing The Heterozygote Advantage: Population Parameters and Morph in Swainson's Hawks

12:00 – 12:30 **R. W. NELSON**, G. COURT. When Peregrines Fight: Territorial Advertisement and Defense Behaviour

Lunch

General session 11 (Moderator: Mike Kochert)

14:00 – 14:30 *__T. MILLER__ et al. Modeling Migratory Flight Characteristics of Eastern North American Golden Eagles (*Aquila chrysaetos*) Using High Frequency Telemetry Data

14:30 – 15:00 **L. L. SEVERINGHAUS**. Another Piece of the Puzzle in the Grey-Faced Buzzard (*Butastur Indicus*) Migration Story

15:00 – 15:30 **V. BRETAGNOLLE** et al. Monitoring of French Diurnal Raptors: Distribution, Abundance and Trends

Coffee & Tea

General session 12 (Moderator: Massimo Pandolfi)

16:00 – 16:30 **A. C. STEWART** et al. Non-breeding Period Observations of a Marked Population of Urban-nesting Cooper's Hawks

16:30 – 17:00 **E. WESTON** et al. Post-fledging Movements of Golden Eagles in Scotland

17:00 – 17:30 ***R. F. LOURENÇO** et al. Intraguild Predation by a European Top Predator – the Eagle Owl (*Bubo bubo*)

Friday 2 October 2009

Haliaeetus session 1 (Moderator: Mike McGrady)

09:00 – 09:30 **W. W. BOWERMAN** et al. Potential Effects of Climate Change on *Haliaeetus* Eagles: A Risk Assessment Approach

09:30 – 10:00 **M. Z. VIRANI** et al. African Fish Eagle *Haliaeetus vocifer* Studies at Lake Naivasha, Kenya

10:00 – 10:30 **J.M. SHEPHARD** et al. Contemporary Conservation Status of the White-bellied Sea Eagle in Australia: A Tale of Many Scales

Coffee & Tea

Haliaeetus session 2 (Moderator: Bill Bowerman)

11:00 – 11:30 **A. O. FOLKESTAD**. White-tailed Sea Eagle (*Haliaeetus albicilla*). Pattern of Re-settlement in the Fjords and Coastal Areas of Western Norway

11:30 – 12:00 **T. NYGÅRD** et al. Juvenile White-tailed Sea Eagles' (*Haliaeetus albicilla*) Movement Patterns at Smøla Wind-farm in Norway Determined by Satellite Telemetry

12:00 – 12:30 **P. E. NYE**. Restoration of Breeding Bald Eagles (*Haliaeetus leucocephalus*) in the Northeast United States, a Three Decade Summary

Lunch

Haliaeetus session 3 (Moderator: Ruth Tingay)

14:00 – 14:30 **R. T. WATSON** et al. Conservation of the Madagascar Fish Eagle *Haliaeetus vociferoides*: Past, Present, and Future

14:30 – 15:00 **J. A. JOHNSON**, R.E. TINGAY. Long-term Survival Despite Low Genetic Diversity in the Critically Endangered Madagascar Fish-eagle

15:00 – 15:30 I. UTEKHINA et al. Steller's Sea Eagles (*Haliaeetus pelagicus*) in Magadan District, Russia Over the Past 18 Years [Presenter: E. Potapov]

Coffee & Tea

Reintroduction session 1 (Moderator: Duncan Orr-Ewing)

16:00 – 16:30 **D. K. GARCELON**, P.B. SHARPE. Reintroduction of Bald Eagles to the California Channel Islands: a 30-year Project Report

16:30 – 17:00 **A. MEE**, J.A. HAMBER. Supplementary Feeding in Raptors: Apparent Negative Effects on Recovery in a Population of California Condors (*Gymnogyps californianus*)

17:00 – 17:30 **C. RUIZ** et al. Releasing and Monitoring of Bearded Vulture (*Gypaetus barbatus*) in Andalusia: LIFE NAT/ES/000056

Saturday 3 October 2009

Atholl Suite

General session 13 (Moderator: Eugene Potapov)

09:00 – 09:30 **F. J. VILELLA**. Dispersal of Insular Caribbean *Buteo* Hawks: Ecological Constraints and Conservation Implications

09:30 – 10:00 **I. NEWTON.** Territory quality and breeding success in sparrowhawks (Accipiter nisus)

10:00 – 10:30 *__A. VILLERS__ et al. Understanding Density Dependent Processes in Golden Eagle: 35 Years of Recovery in the Italian Alps

Coffee & Tea

General session 14 (Moderator: Malcolm Ogilvie)

11:00 – 11:30 **Ü. VÄLI** et al. Widespread Hybridisation of the Greater and the Lesser Spotted Eagle in Europe: A Genetic Study

11:30 – 12:00 **R. BOSCH** et al. Home Range and Habitat Selection in Bonelli's Eagle *(Aquila fasciata)*: Implications for Conservation

12:00 – 12:30 * **L. BARDO**, D.M. BIRD. Influence of Long-term Captive Breeding on the Biology of the American Kestrel

Lunch

14:00 – 17:30 No talks

Saturday 3 October 2009

Bow Lounge

08.00 – 08.50	RRF AGM (all welcome)
	Conservation Management session 1 (Moderator: Bea Arroyo)
09:00 – 09:30	**J. PARRY-JONES**. Establishing a Captive Breeding Programme in Response to the Asian Vulture Population Crisis: Difficulties and Solutions
09:30 – 10:00	V. PRAKASH et al. Remedial Action for Critically Endangered Vultures in India [Presenter: R.E. Green]
10:00 – 10:30	**R. E. HARNESS** et al. Bird Spikes are Ineffective to Prevent Saker Falcon (*Falco cherrug*) Electrocutions in Mongolia
Coffee & Tea	
	Conservation Management session 2 (Moderator: Javier Bustamante)
11:00 – 11:30	**T. CORNULIER** et al. Killing One Bird With Two Stones: Predicted Effects Of Agricultural Intensification And Climate Change On Montagu's Harrier Population Dynamics
11:30 – 12:00	**M. W. WILSON** et al. Breeding Success and Habitat Requirements of Hen Harriers (*Circus cyaneus*) in Ireland
12:00 – 12:30	J.E. GUTIÉRREZ et al. Evaluation of Actions for the Reintroduction of *Gypaetus barbatus* in Andalusia (southern Spain): LIFE NAT/ES/000056 [Presenter: M. Liñán]
Lunch	
14:00 – 17:30	No talks

SCIENTIFIC PROGRAMME

POSTER PRESENTATIONS

*denotes competing for student presentation award

E. ALVEREZ et al. Lesser Kestrel Corridors

A. ARADIS, F. CAULI. Monitoring a Montagu's Harrier (*Circus pygargus*) Population in Central Italy

***M. V. BABUSHKIN**. Diet of White Tailed Sea Eagle *(Haliaeetus albicilla)* in Darwin Reserve (North-West Russia)

J. C. BEDNARZ et al. The Current Status and Conservation of Breeding Swallow-tailed Kites in Arkansas

V. A. BONTZORLOS et al. Recreation of Karla Lake in central Greece. Does it Produce an Optimum Foraging Habitat for Barn owls?

J. BUSTAMANTE et al. Monitoring Global Change with the Lesser Kestrel (*Falco naumanni*): Development of an Automatic Remote Monitoring System

D. CSERMELY et al. Do Claw Geometrical Characters Differ in Owls, Raptors, and Non-Raptorial Species?

B. E. ETHERIDGE et al. Scottish Raptor Monitoring Scheme: Trends in Scottish Raptor Populations 2003-2007, and Future Directions

R. J. EVANS et al. Adult Nest Attendance and Prey Pelivery by White-tailed Eagles *Haliaeetus albicilla* in Scotland

M. GÁLVEZ, **A. MILLET** et al. The connection of European populations of Black Vulture: update of the Catalan Pyrenees reintroduction program (NE Spain)

A. GAMAUF. Honey-buzzard (*Pernis apivorus*) Telemetry: Post-nuptial Behaviour, Dispersal and Habitat Selection

L. J. GOODRICH et al. Behavior of Autumn-migrating Sharp-shinned and Cooper's Hawks (*Accipiter striatus, A. cooperii*)

T. G. GRUBB et al. Unexpected Indifference of Golden Eagles (*Aquila chrysaetos*) to Heli-skiing and Military Helicopters in Northern Utah, U.S.A.

C. HENNY et al. PBDE Flame Retardants in Eggs Reduce Reproductive Success of Ospreys in Oregon and Washington, USA

T. INOUE, T. YAMAZAKI. Do the Golden Eagle (*Aquila chrysaetos*) and the Mountain Hawk Eagle (*Spizaetus nipalensis*) Adapt Enough to the Habitat of Japan?

***E. Z. K. JOACHIM** et al. Post-nestling Survival and Dispersal of Radio-tagged Little Owls (*Athene noctua*) in Britain

P. R. JUVVADI. Raptor Nests on Power Lines in Andhra Pradesh, India – Species Recorded, Type of Structures Used and Concerns Raised by the State Transmission Utility

C. M. KEMPER, G. S. COURT. Recovery Initiatives in an Endangered Population of the Ferruginous Hawk (*Buteo regalis)*

N. KENNTNER et al. Risk Assessment of Environmental Contaminants in White-tailed Sea Eagles (*Haliaeetus albicilla*) from Germany

K. L. KEYES et al. Assessment of Movement Patterns in the Short-eared Owl *(Asio flammeus)*

L. KIFF. Global Raptor Information Network

J. KNOTT, R.E. GREEN. Impacts of Lead Poisoning on Raptors

***J. P. LUSBY** et al. The Impacts of Two Introduced Small Mammals on the Barn Owl *(Tyto alba)* Population in Ireland

S. MAÑOSA et al. Diet Adaptability of Golden Eagle (*Aquila chrysaetos*) in Southern Pyrenees

T. MURATE, T. YAMAZAKI. Locating System for the Potential Nesting Area of the Mountain Hawk-Eagle (*Spizaetus nipalensis orientalis*) in Japan

***B. G. O'DONOGHUE** et al. Over-wintering Hen Harriers (*Circus cyaneus*) in Ireland

L. PALMA et al. An Integrated Conservation Project for Tree-nesting Bonelli's Eagles (*Aquila fasciata*)

D. C. PAYER et al. Recovery of American Peregrine Falcons (*Falco peregrinus anatum*) in Eastern Interior Alaska, U.S.A., 1979-2008

R. SALLABANKS, S. J. KNETTER. Recovery, Delisting, Protection, and Monitoring of the Bald Eagle (*Haliaeetus leucocephalus*)

G. M. SANTOLO et al. Embryonic Development of the American Kestrel (*Falco sparverius*)

***S. SCHINDLER**, K. POIRAZIDIS. Population Trends and Management Scenarios for the Diverse Raptor Community of Dadia NP, Greece

J. SMART et al. Diversionary Feeding: is it Effective at Reducing Kestrel Predation?

R. STEEN. The Use of a Portable Digital Video Surveillance System for Monitoring Prey Deliveries at Raptor Nests

L. TAPIA et al. Habitat Selection and Conservation of Golden Eagle *Aquila chrysaetos* in a Low-density Area in NW of Spain

***J. TERRAUBE** et al. Level of Organochlorine Compounds in Plasma in Blood of Montagu´s Harriers (*Circus pygargus*) Breeding in Farmland and Natural Vegetation

R. E. TINGAY. Re-evaluating the Conservation Status of the Critically Endangered Madagascar Fish Eagle

Ü. VÄLI, **G. SEIN**. How Much Does the Climate Change Threaten Sympatric Golden Eagle *Aquila chrysaetos* and Lesser Spotted Eagle *A. pomarina* Populations in the Lowlands of Northeastern Europe?

D. VASILAKIS et al. Remote Control Monitoring Techniques to Assess the Impact of Wind Farms on Raptors: a Case Study from Thrace, NE Greece

***E. A. WOMMACK**. Examination of Sexual Signals in the Plumage of the American Kestrel (*Falco sparverius*)

P. B. WOOD, D.A. BECKER. Raptor Population Response to Intensive Forest Management

T. YAMAZAKI, TAKEHIKO INOUE. Why Are Almost All Second Chicks of the Golden Eagle (*Aquila chrysaetos*) in Japan Killed by the First Chicks?

ORAL PRESENTATIONS

ABSTRACTS

Population Dynamics of Orkney Hen Harriers: Data from over 50 years of Monitoring

A. AMAR, E. MEEK, J. WILLIAMS, Royal Society for the Protection of Birds – Scotland, Dunedin House, 25 Ravelston Terrace, Edinburgh, EH4 3TP, UK. S. REDPATH, Aberdeen Center for Environmental Sustainability, Tillydrone Avenue, Aberdeen AB24 2TZ, UK.

The Hen Harrier (*Circus cyaneus*) population on the Scottish Orkney islands have been monitored since 1953. This population has shown changes that reflect the changing social and environmental landscape of these islands. We here provide an overview of the population monitoring that has taken place and examine what we have learnt from this long term monitoring. Following the end of human persecution this population increased during the 1950s, 60s and 70s, before declining to very low levels during the 1990s. Research aimed at determining the cause of this decline revealed that changes in agricultural practices, in particular increases in sheep numbers, had reduced the availability of prey. This shortage of food reduced the frequency of polygyny in the population, which has a skewed sex ratio, which in turn suppressed the breeding output of the population. Numbers and breeding success have increased since 2000 and coincide with a recovery project aimed at improving habitat conditions for this species, and a reduction in sheep numbers caused by changes to the agricultural support mechanism.

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Home Range Sizes and Foraging Habitat Selection in the Montagu´s Harrier (*Circus pygargus*): Implications for Conservation Management

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The Montagu's Harrier (*Circus pygargus*), a ground-nesting semi-colonial bird of prey typical of agricultural areas, is considered vulnerable in the Iberian Peninsula, the stronghold of the Western European population. The region of Extremadura holds one of the most important breeding populations within Spain. There are currently many conservation programmes focussing on this species within Spain, including Extremadura. However, these are usually biased towards protecting nests or breeding habitats. On the other hand, effective management of areas for vulnerable species must also consider their foraging needs, and include protection of foraging habitats in conservation plans. During 2007 and 2008 we carried out research to evaluate home-range sizes, maximum hunting distances from the nest and the degree of overlap between neighbouring individuals, and to assess habitat selection within home ranges. Radio-transmitters were attached to 19 males and 11 females in three areas with different agricultural systems (cereal, mixture of cereal and pastures, and mixture of vines, olive groves and cereal). Location of these birds was obtained through plotting bi-angulations. Home ranges were calculated using Kernel analyses. Habitat within the home ranges (evaluated with a GIS) was compared with habitat available in the study areas. Over 1000 pellets were analysed to determine diet. Males had an average home range of 24.1 ± 16.3 km^2, whereas females had smaller ranges (6.7 ± 3.5 km^2). Large overlaps (54 ± 27%) between ranges of neighbouring individuals were observed. Hunting distance from the nest increased throughout the breeding season. The maximum distance recorded was 13 km. Diet varied among the three study areas, and

habitats selected for foraging also varied among the areas. Habitats selected in each area were apparently those in which the preferred prey was more accessible. These data show that it is important to provide habitats with strong prey abundances around breeding colonies, while noting that vegetation cover of these habitats may differ according to farming systems.

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Preliminary Results on Spring Migration of Raptors across the Straits of Gibraltar

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Knowledge about raptor migration across the Straits of Gibraltar was studied during the 1970s and early 1980s and the effort was focused on autumn migration. Despite much progress in all fields of research during the last 35 years with respect to raptor migration, Bernis's book is still the most comprehensive source of information about raptor migration in this important bottleneck area, although it ignores spring migration. In this presentation, we launch the results obtained during 2008 pre-nuptial migration (from January to late June) including 27 species and almost 100,000 raptors travelling from Africa to Europe. The influence of weather on crossing behaviour and the phenologies are discussed, and a standardised survey protocol for a long-term monitoring is also presented.

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Influence of Long-term Captive Breeding on the Biology of the American Kestrel

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Captive breeding programs can be used both to supplement depleted or extirpated wildlife populations and to provide models for wildlife research in controlled environments in fields ranging from toxicology to reproductive physiology. While the objective of such long-term captive-breeding programs is to maintain self-sustaining populations capable of preserving most of their original heterozygosity, a captive environment and a small gene pool can lead to behavioural, morphological and physiological changes within a population over time, i.e. in as little as 10-20 generations in some species. Understanding the effects of captivity on an individual and on a population can help identify changes that need to be made to captive regimes to maintain as much as possible a species' original wild state. This can be accomplished by comparing differences between captive and wild individuals. Having maintained a breeding colony of American Kestrels (*Falco sparverius*) for more than three decades at McGill University provides a unique opportunity to study the effect of long-term captive breeding on a non-domestic bird species and the first of its kind on a raptor species. The overall aim of the study is to determine what changes, if any, have resulted from over 30 generations of captive breeding of the American Kestrel by comparing a pedigreed colony of captive birds to wild kestrels of the same regional ancestral background. A series of measurements and trials have been used to look for differences in morphological features and in behavioural and physiological responses to various stimuli between wild and captive-bred kestrels. Reproductive success and growth rates of nestlings cross-fostered into both environments are also compared. Three seasons of data collection have yielded measurements from nearly 80 adults and over 200 nestlings from 54 nests and the results are currently being analyzed. A final upcoming field season will be completed in 2009.

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Results of a 10 Year Raptor-Migration Monitoring Survey in the Straits of Gibraltar

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The Straits of Gibraltar is one of the most important bottleneck areas in the Western Palaearctic for migratory raptors. The use of systematic protocols contributing comparable data is an essential requirement in long term bird-migration monitoring surveys. In 1997, the Regional Government of Andalucía started the "Programa Migres", with the main goal of obtaining information on the trends of populations of the different groups of birds migrating across the Straits of Gibraltar. Here we present a standardised monitoring survey protocol for autumn raptor-migration and we analyse the evolution of both phenological and abundance indices of the main raptors species in a 10-years series.

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Cape Vulture Reproductive Activities at the Kransberg Colony, South Africa – a 28 Year Retrospective

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The Cape Vulture (*Gyps coprotheres*), a southern African endemic, is one of the most studied vulture species. Though many popular and scientific papers have been published concerning this bird, few long-term studies exist of it's reproductive activities. This presentation is part of an ongoing study on many aspects of Cape Vulture biology. As a species listed as vulnerable, both regionally and internationally, many factors have been identified as contributing to the Cape Vultures' conservation status. Though Cape Vulture numbers and range have declined over the past century, fluctuations in breeding pair numbers and breeding success, in this study, suggest the picture is more complex than just a listing of "risk factors" to the bird. Little data have been presented concerning "natural" factors affecting its breeding activities and success, and without this information, risk factors and their impact on Cape Vulture numbers can not be properly assessed. Numbers of breeding pairs at the Kransberg and other colonies in the former Transvaal Province (Limpopo, Gauteng, Northwest and Mpumalanga provinces) have declined from the early 1980's when this study began, but from 2003, breeding pair numbers have increased at the Kransberg colony and elsewhere. Changes in reproductive activities at the Kransberg Cape Vulture colony over the last three decades are discussed in respect to natural and anthropogenic factors. Data from other colonies are considered and compared.

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Migration and Wintering Behaviour of Juvenile Ospreys (*Pandion haliaetus*) as Determined by Satellite Telemetry

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Satellite telemetry studies have documented the migratory and wintering behaviour of adult Ospreys, with well over 100 birds tagged to date in North America. Very few first-year Ospreys have been tracked on their first and subsequent migrations. We know that adults return to the same wintering sites annually and remain in very restricted areas for about five months prior to returning north. We know little of how first year birds arrive on and select wintering areas and how much they move around in their first and subsequent winters. Between 1998 and 2007, we tagged 15 juvenile Ospreys on their nests on the east coast and seven in the midwest of North America. Of these, all but two initiated migration. Two disappeared north of Florida, one disappeared crossing the Atlantic and one over the Caribbean. Signals were lost from three others over land while migrating south of Cuba. Seven birds stopped transmitting on their wintering grounds. At least one of these

was shot. Four birds have completed two migration cycles, and two are currently overwintering after their first migration. Of the birds that settled on the wintering grounds, five moved very little once they stopped heading south and three continued explorations, working out of known sites for months, making exploratory excursions sometimes covering hundreds of km, often navigating back to their base area from a different direction. Nearly all adult Ospreys from eastern North America move south in a broad front, eventually funneling through Florida and Cuba to Hispaniola and thence to South America. Juveniles follow more varied routes than adults. Two young crossed the Atlantic from Massachusetts to the Bahamas (covering 1,600 and 2,400 km of open ocean), and a relatively large percentage make the longer crossing from Cuba to Central America, rather than the shorter Hispaniola-South America route.

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Unusual Summer Initiated, Long Distance, Northbound Migration of Non-breeding Red-tailed Hawks from Southwestern California

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As part of a natal dispersal study of red-tailed hawks in southwestern California we banded over 6,200 nestling red-tailed hawks (*Buteo jamaicensis calurus*) between 1970 and 2009 and affixed 24 PTT transmitters (13 with useable data) on fledglings between 2004 and 2009. Red-tailed hawks that departed their natal area and traveled distances greater than 100 km did so in a north to northeasterly direction generally into the Great Basin Desert and surrounding environs. All hawks with PTT transmitters initiated their first northbound migration from southern California in late June or early July about 4 - 6 weeks post-fledging, some traveling as far as northern Idaho and southwest Montana (Yellowstone National Park) in less than a month and returning in August or September of the same year. One fledgling with a PTT transmitter from the 2004 cohort made 4 round trip migrations from 2004 through 2007 between its natal region in southern California and Idaho or Oregon. This bird never nested and was electrocuted in southern California in spring 2008. Plausible explanations for why this southern California population of red-tailed hawks performs this apparently unique migration are discussed.

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Barn owl Feeding Habits in Mediterranean Agroecosystems of Central Greece. Spatial and Temporal Diet Patterns

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Although Barn Owls have been studied in-depth over most of their distribution, in Greece - the SE outpost of the owl's European breeding range - only 12 published studies exist to-date. All twelve studies deal with feeding habits, but none of them has addressed specific ecological hypotheses. The main aim of the present study was to investigate the feeding habits of the species in the region of Thessaly which probably holds the largest population in Greece. Barn Owl diet was studied according to various environmental gradients: land use, soil and habitat types, as well as at temporal scales in combination with seasonal crop-rotation effects. 10,065 pellets were analyzed, from three years, at 31 sampling points, and a total of 29,061 prey items were identified. Multivariate data analysis revealed that during breeding seasons, foraging occurred mainly over non-arable irrigated cultivations, set-aside

fields and natural grasslands. These habitat types are important for vole species: common prey for Barn Owls. As vole abundance declined, owl diet became more diverse including less favoured species, and foraging activity was expanded over unfavourable habitats. During winter, diet was more diverse but more dependent on rats, compared to other Mediterranean studies. A dietary shift was also noticed on both latitudinal and longitudinal gradients, related mainly with the change of land uses and irrigation schemes. These results indicate that in the dynamic agroecosystem of Thessaly, there is a high human impact on owls' diet according to agricultural practices. The small extension of favourable foraging areas in Thessaly, in combination with low vole years could probably have negative implications for the species' breeding success. Results of this work are also in concordance with other recent publications, indicating that a priority conservation measure should be the preservation and, if possible, the increase of semi-natural habitats in similar agroecosystems.

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Gyrfalcon (*Falco rusticolus*) Dispersal and Site Fidelity in western Alaska, USA

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Dispersal is a fundamental attribute of a species' biology and is important to our understanding of raptor population dynamics. However, obtaining data to document dispersal movements of an uncommon species that inhabits remote landscapes such as the Gyrfalcon (*Falco rusticolus*) is difficult. We used non-invasive genetic sampling and DNA microsatellite analysis of breeding Gyrfalcons on the Yukon Delta National Wildlife Refuge in western Alaska to document breeding dispersal and nest site fidelity over a 5 yr period (2003-2007). Our preliminary analyses of the first 3 yrs of data suggest all the following: 1) Eighty-five percent of the adult breeding females did not exhibit breeding dispersal and remained site faithful. 2) Females that did disperse typically nested less than 10 km from the site at which they were first detected breeding. 3) Adult males appear to be less site faithful, although a gender bias in non-invasive samples may be present, and we are investigating this possibility. Samples from 2006 and 2007 have been processed, and those preliminary results will be included and discussed in the context of advancing our understanding of raptor population dynamics and the utility of non-invasive genetic sampling in raptor research.

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Home Range and Habitat Selection in Bonelli's Eagle *(Aquila fasciata)*: Implications for Conservation

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The Bonelli's Eagle is an endangered species in Europe that has declined by 20-50% in the last three decades. One of the reasons for this decline has been attributed to the loss of suitable habitat caused by land-use changes such as housing, infrastructure developments and the loss of traditional farming. Under EC Wild Birds Directive, Special Protection Areas (SPAs) have been created for this species to conserve adult home ranges and to actively manage their habitats. However, little is known about eagle home ranges and habitat use. This work reports data of home range and habitat selection of 18 Bonelli's Eagles *(Aquila fasciata)* radio-tracked during a year in Catalonia (north-eastern Spain). The average

home range sizes were, by MPC, 63.33 km^2 (range: 31.57-129.89 km^2) and, by 95% Kernel, 43.72 km^2 (range: 20.71-110.65 km^2) all year-round. Home ranges were significantly bigger in non-breeding season. Regarding habitat selection, Mediterranean scrub represented an average of 38.1 % of the surface of the home range (range: 14-59%), coniferous forests 18.6 % (range: 0-45%), ligneous crops 15.1 % (range: 0-45%) and dry meadows 9.5 % (range: 0-60%). Individual and temporal differences between home ranges and habitat selection could be related to the breeding cycle of eagles, the availability of trophic resources and human pressures in different areas and habitats. The implications of our results for conservation of Bonelli's eagle home ranges are apparent at different spatial scales. On one hand, breeding areas have to be conserved to guarantee the maintenance of the occupancy and breeding of the eagles. On the other hand, the management and conservation of Mediterranean scrub, where their main prey live, is essential to ensure the survival of the eagle and their breeding success. The conservation of Bonelli's eagle home ranges, as an umbrella species, could be a useful strategy to protect Mediterranean landscapes and implementing sustainable regional planning.

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Potential Effects of Climate Change on *Haliaeetus* Eagles: A Risk Assessment Approach

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The effects of climate change on many wildlife species is a new area of research. Long-term data sets on raptor populations may hold the key to documenting these impacts at local to ecosystem scales. The use of morphometric measures to determine approximate nestling age allowed for the examination of Julian date of first egg lain for over 2300 Bald Eagle (*Haliaeetus leucocephalus*) breeding attempts in Michigan since 1988. Dates of first egg laid average 0.3-0.9 d earlier each year, depending on nest location. A comparable dataset for White-tailed Sea Eagles (*H. albicilla*) nesting along the Baltic coast of Sweden will be examined using the same methods. If eagles are nesting earlier due to climate change effects on their local environment, what other impacts may be potentially impacting their populations in the future? We couple predictive climate change models to previous range maps and body mass data for all 8 *Haliaeetus* eagles to produce a crude relative risk assessment for these species. Models will be fairly conservative, since large-scale changes can only be predicted, however, erratic weather events (early-late snow storms, hurricanes, etc.) may be more frequent and potentially have greater impacts on local raptor populations. The need to maintain long-term datasets is important if we are to understand our environment and the changes we are causing. Ringing records should be re-examined to understand local changes for long-term ringing locations. Ringing data from the northern Lower Peninsula of Michigan indicates that nestling eagles are of sufficient size 6 weeks earlier than in the mid-1960s. Eagles and raptors are now warning us of the impacts of climate change, much like they did earlier with impacts of DDT and other environmental pollutants.

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Simulation of Golden Eagle (*Aquila chrysaetos*) Migration Pathways Through the Central Appalachians

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Rapid wind energy development in the central Appalachian Mountains of eastern USA has generated concerns about potential impacts on migrating raptors. In particular, a small population of Golden Eagles (*Aquila chrysaetos)* migrates and winters in the region. These birds often use slope soaring at low altitude during migration and foraging; such flight behavior has been associated with collisions with turbines at several sites. Therefore, Golden Eagles may be at particular risk of collisions during migration through the central Appalachians, or of disruption of migration and wintering patterns due to avoidance behavior. Because monitoring data are lacking from many areas where wind energy sites are now being proposed, tools for prediction of migration pathways at large spatial scales are needed to assess the potential for impacts of wind energy development on Golden Eagles. We developed a spatially explicit individual-based model to predict raptor migration pathways under slope soaring conditions. The model incorporates probability-weighted directional choice based on both local (adjacent pixel) updraft strength and non-local conditions (i.e., nearby terrain features) as well as random behavior. Here we apply the model in a dynamic mode at large spatial scales (over 100s of km) using hourly weather data from meteorological stations throughout the region. We compare the model results to migration tracks of Golden Eagles based on hourly Argos GPS telemetry. The model identifies areas within the central Appalachian region where eagles are expected to be concentrated during migration, and can be used together with existing ground-based monitoring and telemetry data to delineate regions where eagles are at particularly high potential risk from wind energy development. The model is adaptable to other regions of varied topography and other raptor species that use slope soaring during migration.

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Monitoring of French Diurnal Raptors: Distribution, Abundance and Trends

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Raptors have been monitored in France at least since the sixties. However, until 2000, monitoring schemes were highly variable between species, and for many of the most common raptors, there were no accurate data on distribution, abundance and trends. This situation evolved dramatically between 2000 and 2002, when the first standardised national enquiry on raptors was set up for the 25 breeding species. Based on a systematic spatial survey on more than 1200 25km² squares, the survey provided the first fine scale resolution maps for the distribution of each species, but more importantly, the first population size estimates (with confidence intervals) for many of the most common species. In many cases, the figures were astonishing (e.g. 165,000 pairs for common buzzard). Since 2004, LPO has organised with scientists from the CNRS Chizé a regular (yearly basis) survey dedicated to the 10 most common raptor species, which involves hundreds of volunteers. In addition, several species (kites and harriers) are monitored on a 3 to 5 years basis. Lastly, the 10 least common species are counted every year. We will present an up to date of the results of these estimates and trends, with examples ranging from buzzards, kestrels, red kite, Montagu's harrier and rare raptor species.

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Testing the Heterozygote Advantage: Population Parameters and Morph in Swainson's Hawks

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We examined the heritability and differences in life-history characteristics of individuals with varying plumage polymorphisms in Swainson's Hawks (*Buteo swainsoni*). While we have previously documented male mate preference for maternal phenotypes, we have not found an ultimate mechanism to explain persistent polymorphisms among Swainson's Hawks. Work on another buteo species (*Buteo buteo*) has shown heterozygous advantage helps explain prevalence of multiple morphs in that species. We assessed the hypotheses of differential survival, reproduction and recruitment of our morph classes. We separated individuals into three categories; light, intermediate and dark. We used 25-years of mark-resight data in Program MARK to assess differences in survival between morph classes. We used 15 years of nest monitoring data in a mixed-model regression to assess differences in reproduction between morph classes. Plumage morph followed a simple Mendelian pattern of a trait with one locus and two alleles, where intermediate individuals are heterozygous. There was no evidence for differences in survival, reproduction, or recruitment of offspring among the different morph classes. The life-history characteristics of Swainson's Hawks seemingly can not explain persistent plumage polymorphisms and the mate choice of male Swainson's Hawks.

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Comparing Reproduction of Three Raptor Species with Logistic Exposure Models

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The status of raptor populations is often assessed by estimates of reproductive success. Recent advances in the modeling of avian nesting success are promising, but the usefulness of these approaches for real-world raptor monitoring projects is unclear. We analyzed long-term data sets of nesting attempts by Golden Eagles (*Aquila chrysaetos*), Prairie Falcons (*Falco mexicanus*) and American Kestrels (*Falco sparverius*) in southwestern Idaho, USA, by fitting logistic exposure models of daily nest survival rates. Despite the notable differences in life histories and population structures, preliminary results from models without covariates suggest overall nesting success was surprisingly similar for all species, and very close to Mayfield nesting success estimates. However, considering covariates suggested notable differences in reproductive output by species. Preliminary findings indicate nesting success for American Kestrels remained constant across the study period (1992-2005, N=719), whereas Prairie Falcon nesting success showed erratic annual fluctuations (1975-2003 with some gaps, N=1019), and Golden Eagle nesting success varied more slowly over the long term (1982-2005, N=830). Initial analysis suggests measured physical characteristics of nest sites did not influence nesting success of Prairie Falcons or American Kestrels, but Golden Eagle nests that were exposed to afternoon sun were less successful. Kestrel nesting success was higher in those nest boxes that were occupied more often over the long term. The only types of covariates that could not be modeled for each species were nest age and seasonal effects. These effects could only be considered when nests were visited relatively

frequently, as occurred with the American Kestrel. Our preliminary results suggest that logistic exposure models of daily nest survival are useful for exploring raptor population nesting success, even when standard monitoring protocols are used.

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Marsh Harrier (*Circus aeruginosus*) Foraging Habitat Preferences within Agricultural Landscapes

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The study of foraging habitats gives valuable information to understand ecological requirements and population dynamics of species. It is especially relevant in farmland areas where changes in agricultural practices, as intensification or irrigation, are occurring. We studied foraging habitat use and selection by Marsh harrier (*Circus aeruginosus*) during the breeding cycle, by means of radio tagging (6 birds) and visual observation (4 birds), paying especial attention to possible differences between farming systems. Our research was conducted within the Ebro basin, in western Catalonia (Spain), in three Marsh harrier breeding areas. Two of the breeding areas were essentially surrounded by intensive irrigated herbaceous crops, whereas the third one was located in a more heterogeneous area where traditional dry herbaceous and tree crops are adjacent to irrigated fruit trees. Male harriers positively selected herbaceous crops and avoided tree crops, both traditional dry or intensive irrigated. In areas dominated by intensive irrigated herbaceous crops, alfalfa was in general the most positively selected crop while irrigated maize and other crops were avoided. On the contrary, wetlands were the most positively selected habitat by females. These results show that current changes of herbaceous crops into fruit trees, within the Ebro basin, might entail a threat for the species. Preventing those changes, especially near the breeding areas is hardly recommended. Moreover, to make irrigation compatible with Marsh harrier conservation, cultivation of alfalfa with low input of pesticides and avoidance of maize should be promoted in these irrigated areas.

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Killing One Bird With Two Stones: Predicted Effects Of Agricultural Intensification And Climate Change On Montagu's Harrier Population Dynamics

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The intensification of farming systems is recognized as one of the main forces driving the decline of biodiversity in Europe, primarily through the loss of habitats, weed plants and insects, with expected knock-on effects on top predators. Increasingly, climate change is also thought to affect bird populations, for instance by altering the phenology of prey availability. Predicting the effects of agricultural policies, climate changes and their interactions on population dynamics is therefore a priority issue in raptor conservation science. The Montagu's harrier is a ground-nesting raptor. In Western Europe, 70-90% of nests are found in cereal crops, where broods are destroyed if harvest occurs before fledging of the chicks. Nest destruction probability is therefore determined by the relative timing of chick fledging and crop harvesting. Fledging date proximally depends on vegetation height in April and therefore on climate, as well as on prey abundance (and to a lesser extent, female quality). On the other hand, harvesting date is determined by climate indirectly through cereal maturation phenology, directly through summer rains that may delay harvesting, and through ongoing cereal variety improvement. We parameterized a mechanistic matrix population model for the

Montagu's harrier using data from Western France on productivity, survival, breeding and farming phenology. We used our model to: 1- estimate the current sensitivity of harrier population dynamics to nest destruction, 2- predict future impacts under different scenarios of climate and farming evolution and 3- identify priorities for a conservation strategy.

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Illegal Poisoning Trends, Crime-Fighting and Impacts on Vultures in Andalusia, S Spain: LIFE NAT/ES/000056

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Since 2004 Gypaetus Foundation has developed the LIFE project "Actions for the reintroduction of the Bearded Vulture *(Gypaetus barbatus)* in Andalusia" (Mediterranean biogeographical region, southern Spain, 87,268 km^2). In the framework of this project, control actions against threats to Bearded Vultures were developed. Illegal poisoning used against feral dogs and some predators is the current major cause of non-natural death for vulture species in Europe (all four are currently present in Andalusia). Anti-illegal poisoning actions are developed in the framework of the "Gypaetus Foundation Action Plan against Poisoning", which include 24 specific actions. These actions are grouped into three work areas:
1. Information gathering: regional information about illegal poisoning cases (baits and carcasses) are analyzed (over 700 cases, 2001 - 2007), and mapping and reporting are undertaken in order to innovate and improve crime fighting-actions.
2. Prevention and deterrence: direct collaboration, partnership and awareness rising are focused on social groups such as hunters, stockbreeders, journalists, local authorities and students.
3. Fighting the crime: officers are provided with training on removal of potentially poisoned carcasses and taking them into custody. Gypaetus Foundation acts as private prosecutor in all trials related with illegal poisoning in Andalusia, with some successful imprisonment sentences.
The main result of case-analysis was that illegal poisoning shows a negative relationship with mountainous and forest areas and with Natural Protected Areas. Average monthly distribution is mostly concentrated outwith the hunting season, and the improvement in illegal poisoning fighting actions together with an increase in searching effort seem related to an increase the number of cases detected. A systematic data collection system and subsequent analysis of illegal poisoning cases are critical tools to understand, improve and innovate in the eradication of this major threat for biodiversity.

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Why do Non-breeding Crested Caracaras in Florida form Groups?

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Non-breeding Crested Caracaras in Florida regularly form diurnal groups of 20 or more individuals year-round, and traditional nocturnal roosts can contain > 200 caracaras. Caracaras in Florida are threatened by ongoing habitat loss, and protracted grouping may be a life history strategy undertaken in response to habitat saturation. Alternatively, grouping may be previously unrecognized normal activity characteristic of this species. Assuming that proximal benefits of grouping may suggest ultimate causation, we tested 20 potential hypotheses regarding how non-breeding Crested Caracaras may benefit from grouping. Field methods included focal observations, group sampling, aerial telemetry, counts of birds entering communal roosts, and exposure of various size groups to carrion and a simulated predator. Preliminary results suggest that non-breeding caracaras appear to

gain both fine (<10 m) and course scale (>100 m) knowledge of available prey through observation of peers, particularly though observation of older individuals. Hypotheses not supported included: 1) competitive advantage against territorial breeding adults, 2) competitive advantage against other avian scavengers, 3) pack hunting, 4) information transfer at an information center, 5) kleptoparasitic benefits, 6) social learning, 7) evaluation of potential breeding areas, 8) diurnal increased vigilance, 9) diurnal dilution of risk, 10) diurnal predator confusion, 11) diurnal mobbing, 12) alternative mating strategies, 13) mate selection, 14) kin selection, 15) conservation of heat, 16) facilitation of access to water, 17) reduction of movement energy, 18) reduction of ectoparasites. We did not test hypotheses of phylogenetic inertia. Ultimately, caracaras appear to form flocks because each is drawn individually to easy prey items and areas outside of defended territories, rather than being drawn primarily to one another.

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Raptor Crime in Scotland: A History of RSPB Investigation

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The RSPB was formed in 1889 after concern regarding the wholesale destruction of native bird species due to the fashion of wearing ever more exotic feathers in hats. The society expanded its remit and received its Royal Charter in 1904. The destruction of birds of prey in Scotland started with a concerted campaign by gamekeepers in the nineteenth century with several species becoming extinct or their ranges being severely reduced. In recent times human persecution levels have reduced and several species have partially recovered, with others having been reintroduced, or have naturally recolonised. RSPB Investigations team assist the statutory agencies and police in the investigation and follow up of bird crime incidents and act as expert witnesses in court or to prosecutors. The RSPB investigations database documents incidents concerning the poisoning, trapping, nest destruction and shooting of birds of prey in Scotland. This presentation will discuss the slow recovery of Scotland's most iconic birds of prey and will draw on the data contained in the RSPB Investigations database, outlining historical methods used, and illustrating some significant case studies. This will not only give a powerful historical overview but also outline the issues where continuing problems with illegal killing of birds of prey still exist in Scotland's countryside today.

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Do White-tailed Eagles *Haliaeetus albicilla* Compete with Golden Eagles *Aquila chrysaetos* in Scotland?

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After a 60-year absence, a programme to re-introduce White-tailed Eagles *Haliaeetus albicilla* in the west of Scotland was initiated in 1975 and by 2007 a self-sustaining population had been re-established. The question of competition – and in particular whether reintroduced White-tailed Eagles could have an adverse impact on native Golden Eagles *Aquila chrysaetos* – has been raised by a number of authors, but little quantitative data has been analysed to date. In this paper, we review available data on population dynamics, diet and nesting habitat of both species of Scottish eagle, as evidence for competition (or coexistence) between the two species. Breeding populations of both eagles have increased greatly in the area of overlap during the period of White-tailed Eagle re-establishment. Breeding performance of White-tailed Eagles has improved, while there is no evidence for widespread declines in that

of Golden Eagles. Investigations of possible impacts of the arrival of White-tailed Eagles on the breeding performance of individual pairs of Golden Eagles show no evidence of an effect. The findings of an early comparative study of diet, which showed a high degree of overlap between eagles, are not borne out by larger and more recent studies. The two species select nest sites with different characteristics and adopt different strategies to provision them. Taken together, the evidence indicates that Golden and White-tailed Eagles in Scotland partition habitat by altitude, with nest sites close together and foraging areas more widely separated. We conclude that at current densities there is little or no competition between the species in Scotland, but that it cannot be ruled out in response to future population or land use change.

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White-tailed Sea Eagle (*Haliaeetus albicilla*). Pattern of Re-settlement in the Fjords and Coastal Areas of Western Norway

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The main pattern of the settlement of more than 90 newly established White-Tailed Sea Eagle territories is described, covering the re-settlement of the species in an area where the White-tailed Eagle was close to become extinct in the 1970-ies, representing the outskirt of the declining Norwegian population at that time. Compared to 15 occupied sea eagle territories known in the study area by mid 1970-ies, the population by 2008 is estimated at 150 territorial pairs. From strongholds restricted to the most remote and inaccessible parts of the coast, mostly cliff-breeders, the population by now is wide-spread and is predominantly tree nesting. Data from the national monitoring scheme of the White-tailed Sea Eagle 1973-2008 show the pattern of re-settlement of White-tailed Sea Eagle territories in Møre & Romsdal, Western Norway. The data are based on field studies and annually monitoring of the breeding population of White-tailed Sea Eagles in Norway. Behavioural processes of the pattern of settlement of eagle territories and how the eagle's nest sites are dispersed, are described in relation to inter- and intra-specific parameters, and environmental factors and resources and their role in the way the sea eagles are establishing their territories, and are discussed in relation to human activity, and to natural resources. This is important to understand the role of the species in the coastal ecosystems, and for future management of the White-tailed Sea Eagle and how to develop species' actions plans, whether concerning management of remaining populations, or by reintroduction and translocation of birds into areas where the species became extinct. The conclusion is that successful establishing of a new White-tailed Sea Eagle territory in terms of chicks raised to fledging at the mean needs more than three years from the birds are exposing territoriality, though there may be great variation between individual pairs.

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Reintroduction of Bald Eagles to the California Channel Islands: a 30-year Project Report

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In 1980, Bald Eagles (*Haliaeetus leucocephalus*) were released onto the California Channel Islands in an attempt to reestablish a population that had been extirpated in the late 1950s. The reason for the original extirpation was principally due to the introduction of DDT into the marine environment. Between 1980 and 1986, 33 eagles were released using hacking, but subsequent nesting attempts failed. In 1985, it was revealed that 1800 metric tons of DDT acid sludge had been discharged into the ocean adjacent to the Santa Catalina Island release site. Manipulation of eggs and chicks was initiated in 1989 to maintain the population, including some additional hacking of birds. All eggs from active bald eagle nests were removed each year for artificial incubation and replaced with dummy eggs. Of 97 eggs removed from nests from 1989

through 2006, 22 were hatched in captivity. If an insufficient number of eggs hatched via artificial incubation, eaglets produced at a captive breeding facility were fostered into nests. Between 1989 and 2000, 37 eggs analyzed for DDE had a geometric mean concentration of 20.8 ppm fresh wet weight. Seabirds and marine mammal carcasses were the main source of contaminated food items consumed by the eagles. By 2005 the DDE concentrations had began to decline (mean = 14.4 ppm fresh wet weight), but remained above what was thought to allow for successful natural hatching. In 2007, two pairs of eagles successfully hatched their eggs without assistance on Santa Catalina Island and in 2008 four pairs successfully produced offspring. Data suggest that the eagles may be hatching eggs with DDE concentrations previously thought to have a low probability of surviving. With a large proportion of the eagle population successfully reproducing on their own, manipulations will be discontinued although nest monitoring efforts will be maintained.

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The Ground Nesting Raptors on the Mongolian Steppe

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We studied ground nesting raptors on the Mongolian steppe, 1998-2006, involving Saker Falcon *(Falco cherrug),* Upland Buzzard (*Buteo hemilasius)*, Steppe Eagle (*Aquila nipalensis)*, Golden Eagle (*Aquila chrysaetos)*, Cinereous Vulture (*Aegypius monachus*), Lesser (*F. naumanni*) and Common Kestrel (*F. tinnunculus*). Saker Falcon nested on a total of 21 different substrates of which only 1.0% nested on the ground, Upland Buzzard -22.7%, Steppe Eagle - 47.8% and Golden Eagle - 10%. There was no significant difference between clutch and brood size between nests on the ground and other substrates for Saker Falcon, Steppe and Golden Eagles. Ground nesting did not affect breeding success nor allow any advantage to breeding pairs. However, there was a significant increase in clutch size and fledglings in Upland Buzzard. All active ground nests of Upland Buzzard, Saker Falcon and Steppe Eagle were located in the midst of high-density colonies of Brandt's Vole (*Lasiopodomys brandtii)*. Vole numbers declined from 145.8 ind./ha in 2002 to 11.2 ind./ha 2005. This resulted in a decrease, from 11 to 5 pairs, of Upland Buzzard, 1 to 0 of Saker Falcon, and 3 to 0 of Steppe Eagle. Most Golden Eagles built their nests on cliff faces and rock columns and preyed on Mongolian Marmot (*Marmota sibirica)* and Tolai Hare (*Lepus tolai)*. However, some pairs nested on piles of rocks or on the ground sheltered by low rocks. An absence of Mongolian Marmot probably contributed to a decline of ground-breeding raptors.
Raptors breed on the ground not only because of the proximity to prey but also because of low predation rate and Mongolian nomad culture. Further study is needed to understand the role of the ground-nesting raptors and their contribution to the steppe ecosystem, and to enable better conservation strategies for these species in a fast-developing country with increasing tourism.

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Evaluation of Actions for the Reintroduction of *Gypaetus barbatus* in Andalusia (southern Spain): LIFE NAT/ES/000056

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Since 2004 Gypaetus Foundation has developed the LIFE project "Actions for the reintroduction of the Bearded Vulture *(Gypaetus barbatus)* in Andalusia". Within the framework of this 5 year-long project (2004-2009), several conservation, awareness rising and management actions were undertaken and their effectiveness evaluated. In order to evaluate the habitat improvement actions in the reintroduction areas, a regularly updated bio-indicators system was developed. To evaluate the behavioural suitability of the captive-breeding for released individuals, an ethology-monitoring of the released birds was undertaken and analyzed. Local human population was the object of a specific survey, and target social groups - hunters, stockbreeders and local authorities - were methodically interviewed to assess their knowledge and attitude on threats towards the species, and the project actions, among other aspects. Regional data about illegal shooting and poisoning was collected annually and analyzed to assess trends and priorities. As a result, some of the reintroduction areas have achieved a notable improvement in suitability for the Bearded Vulture, although some of the actions, such as control of threats, require a longer period to evaluate their effects to a satisfactory level. Monitoring of released birds showed birds had a good physical condition, self-sufficiency and a 'natural' behaviour for the species. Attitude towards the species, the control of threats and the overall project was positive both at local and regional level. On the other hand, rural inhabitants show a degree of dissatisfaction and concern about the current social and economic changes in these areas and their consequences for wildlife, environmental preservation and traditional farming. Assessment of the effectiveness of any of the actions and their limiting factors is a critical tool to improve and develop new strategies to achieve future goals, as well as providing extremely useful experience-based information for other projects.

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Domestic Reindeer in the Diet of Breeding Golden Eagles in the Calving Season in Finnmark, Norway as Determined by Stable Isotope Analysis

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Golden Eagles *Aquila chrysætos* are considered by Reindeer *Rangifer tarandus* herders in northern Scandinavia to be serious predators of Reindeer, and particularly of calves in the calving season, which coincides with the Golden Eagle nestling period. In the pastoral year 2005-6 Finnmark province alone paid out 8637 compensation payments for losses of Reindeer to predators (93.5% were 'assessed as losses', i.e. no carcass was found), of 45800 reported occurrences. Of these, 2090 payments (24%) were for Reindeer considered killed by Golden Eagles, the vast majority calves.

Feathers from nestling Golden Eagles from different nests in domestic Reindeer grazing areas of Finnmark, Norway, were collected in the breeding seasons 2004-6, along with samples of prey species in 2004. Tissues were analysed for composition of stable isotopes of carbon and nitrogen. Results were further analysed to determine the proportion by weight of the various prey species in the diet of Golden Eagle nestlings in the period. Assumptions in the model were chosen to err on the side of increasing the proportion of Reindeer consumed. Results indicate that in 2004 and 2005 Willow Grouse *Lagopus lagopus* dominated the diet in the nestling period (68% in 2004 and 75% in 2005), with Arctic Hare *Lepus timidus* (13% / 15%) and

Reindeer (11% / 8%) as smaller, but significant, sources. In 2006 Willow Grouse were considerably less usual in the diet (28%), Arctic Hare considerably more common (51%), while Reindeer remained relatively stable as a food source (7%). However, variation between nests was large, from 0 to 31% Reindeer. A simple model of the number of reindeer calves required to satisfy this level of consumption at breeding Golden Eagle territories in Finnmark in the nestling period, assuming breeding adult diets to be similar to that of nestlings, suggests a total seasonal consumption of reindeer calves in the range of two to three figures. On a regional scale the data indicates that losses of Reindeer due to predation by breeding golden eagles cannot be considered as high compared to other sources of loss, even if it is assumed that all reindeer eaten were killed rather than taken as carrion.

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Bird Spikes are Ineffective to Prevent Saker Falcon (*Falco cherrug*) Electrocutions in Mongolia

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In September 2007 we visited a 52 km concrete 10 kV distribution pole line in the Mongolian steppe to document the electrocution rate to Saker Falcons (*Falco cherrug*). Currently there is a trend in Mongolia to substitute older wood pole structures with concrete poles. The concrete poles are built with grounded metal crossarms, resulting in greatly reduced phase-to-ground clearances. We inspected 527 concrete poles constructed in 2004. We detected 68 bird carcasses at pole bases, including 42 raptors (carcass detection rate of 1.3 birds/km). The most common raptor species detected were Saker Falcons (n=13) and Upland Buzzards (*Buteo hemilasius*) (n=12). Smaller raptors such as Common Kestrels (*Falco tinnunculus*) (n=6) and Lesser Kestrels (*Falco naumanni*) (n=1) were also detected. Approximately 45% of the steel crossarms were fitted with between 1 to 4 bird spikes to discourage perching. However, despite the presence of these 38 cm spikes, 21 raptor fatalities (50% of all raptor carcasses) were found under poles fitted with one or more spikes. Even when arms were fitted with the maximum number of four spikes, fatalities were noted. For example, six tangent structures with a full compliment of spikes had 10 dead birds at pole bases, including four raptors. Statistical tests comparing mortality proportions between poles with and without spikes indicated no significant reduction in mortality (P=0.1075). Although power lines can provide positive benefits for raptors, the recent trend to use concrete poles with metal crossarms creates a situation where every pole is potentially lethal and the use of spikes to mitigate this risk is ineffective. If concrete poles with grounded metal crossarms are to be used in raptor habitat, alternative construction methods must be substituted, such as the using suspended insulators or nonconductive crossarms. These recommendations are urgent because of new plans to extend these lethal configurations into additional steppe habitat.

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Population Viability Analysis of the Bonelli's Eagle: Modeling the Whole Western European Metapopulation

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The Bonelli's Eagle *Aquila fasciata* is a territorial accipitrid distributed from the south-east Asia and the Middle East, to western Mediterranean region. The European population of the Bonelli's Eagle is estimated at 860-1100 pairs, ca 80% living in the Iberian Peninsula. This species has undergone a dramatic decline in number and range over the 80s and 90s decades, and is now listed as an endangered species. Here, we performed a population viability analysis on the whole metapopulation of this species in the French-

Iberian range. At this area, local populations differ considerably in demographic characteristics. Currently, southern populations show high adult survival and breeding success, while north-eastern and eastern populations show high adult mortality and relatively low breeding performance. In turn, southern populations showed stability or even slight increases in breeding numbers during the last years, while north-eastern and eastern populations showed an apparent stability. In contrast, northern and north-western populations have undergone increasingly scattered and some of them are nearly extinct. Previous demographic studies showed that population declines are explained by a demographic unbalance essentially caused by high mortality in adult and pre-adult stages. However, little is known on how metapopulation dynamics acts on the local population trends. Here, we use both projection matrix and individual based models to study the whole metapopulation in the studied range. Models are spatially explicit and consider both demographic and environmental stochasticity. Environmental and geographic correlations in vital rates are also evaluated. To do so, we took benefit of long-term demographic data from eleven local populations. Finally, we used the models to make predictions on the expected trend both at the local population and at the metapopulation levels. Viability assessments considered uncertainty on model elements estimates, and are based on the analysis of the distribution of the quasi-extinction probability, sensitivities and elasticities of demographic parameters.

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Presence Only Modelling: Predicting Habitat Suitability for a Rare Raptor in South-east Australia

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Research on species distribution and response to landscape variables is consistently impeded by spatial and temporal issues. Ecologists rely heavily on predictive habitat models to determine suitable habitats and allocation of conservation effort. The quandary with many predictive models is that they require species absences. In some ecological situations, as with threatened or cryptic species, it may be near impossible to accurately determine the absence of a species from an area. To resolve this, presence only models like Ecological Niche Factor Analysis (ENFA) have been introduced into the modelling framework. To assess the ecogeographical variables driving the Powerful Owls' use of environments, and in turn predict habitat suitability for this species over a gradient of urbanisation, a study site was selected in south-east Australia. The study area of 618,500ha covered a suburban to forest gradient. Presence locations for the Powerful Owl were collated from atlas databases and field surveys between 1997 and 2008. Presence data with a set of landscape ecogeographical variables (EGV) were input into Biomapper 4.0 wherein ENFA was used to compare the ecological niche of the species in relation to the ecological characteristics of the entire study area. ENFA produced a series of uncorrelated factors for the production of a Habitat Suitability Map. Biomappers' area-adjusted frequencies were employed to validate the model. This model indicated that the several environmental characteristics are driving the presence of this species. ENFA therefore provides an effective tool for determining habitat suitability for the Powerful Owl. Due to its robust nature this modelling technique can be utilised for a wide range of species. The outcome of this form of modelling are twofold ensuring the species is conserved at *i.* the landscape level by ensuring that the landscape retains the ecological variables the species requires and *ii.* at a site level by highlighting more suitable environments for further targeted research.

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Long-term Survival Despite Low Genetic Diversity in the Critically Endangered Madagascar Fish-eagle

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Human mediated changes in landscape over the past 100 years have placed considerable pressure on many populations. From a conservation perspective, it is important to identify factors that contribute to population decline and to alleviate such pressures, thereby preventing species and population extinction. Similarly, it is also important to recognize that small population size does not necessarily necessitate a "doomed to extinction" scenario. Many populations, particularly top-predators, have persisted at small size for hundreds to thousands of generations. Therefore, our ability to discern between a declining population and a stable population of small size is crucial for efficient conservation management. Here, we use genetic data to investigate the population demographic history of the critically endangered Madagascar fish-eagle (*Haliaeetus vociferoides*), one of the rarest birds of prey and considered at significant risk of extinction. In the most recent census, only 222 adult individuals were recorded with an estimated total breeding population of no more than 100-120 pairs. Based on 47 microsatellite loci, the Madagascar fish-eagle possesses extremely low levels of genetic diversity compared to other surveyed *Haliaeetus* species, including its sister species the African fish-eagle (*H. vocifer*). Determining whether this low diversity is the result of a recent bottleneck or a more historic event has important implications for their conservation. Using a combination of coalescent-based methods, we show that Madagascar fish-eagles have been maintained at a small effective population size for hundreds to thousands of years and that its low level of neutral genetic diversity is not the result of a recent bottleneck event. Therefore, efforts made to prevent Madagascar fish-eagle extinction should place high priority on maintenance of habitat requirements and reducing direct and indirect human persecution.

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Reassessing Determinants of Offspring Sex Ratio Variation of Sexually-Dimorphic, Long-lived Vertebrates: Stochastic Variation or Threshold-based Mechanisms?

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Sex ratio theory attempts to explain observed variation in offspring sex ratio at both the population and brood or litter levels. In the context of low-fecundity, high-investment organisms, however, the drivers of adaptive variation in sex ratio are poorly understood. For raptors, which display reverse sexual dimorphism (RSD), preferential allocation of resources to the cheaper sex (male) is predicted to increase overall parental reproductive success. Nonetheless, there has been scant documentation of such sex ratio manipulation, and studies have reported contrasting male-biased, female-biased, and unbiased sex ratios.
To reassess the applicability of sex ratio theory to long-lived RSD avian species, we evaluated the offspring sex ratio of eastern imperial eagles *Aquila heliaca* at a nature reserve in Kazakhstan, and its links to potential dietary, environmental, and demographic parameters. We found no reserve-wide average or biotic-based regional differences in sex ratio in any year of our study. Sex ratios were also often, but not always, independent of dietary

diversity, average monthly precipitation, and productivity. Given the ambiguous explanatory nature of both our data and of studies of avian sex ratio variation in general, we propose a theoretical mechanism to explain these patterns. This mechanism invokes stochastic variation in brood sex ratio in most years, with occasional adaptive manipulation of brood sex ratio in years when environmental parameters synergistically interact to pass a threshold that drives eagles to manipulate offspring sex ratios.

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Lead Poisoning in White-tailed Sea Eagles (*Haliaeetus albicilla*) – How to Solve the Problem

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Post mortem examinations of over 391 White-tailed Sea Eagles (WTSE) from Germany revealed that lead intoxications are the most important cause of death (23% of mortality). Here we identify the causes of oral lead intoxications of WTSE and test potential solutions. In this joint project the involved stakeholders from hunting organisations, ammunition industry, ammunition dealers, foresters, and nature conservationists are integrated and informed on a regular basis. The causes of lead intoxication are elucidated by investigating the sources of lead poisoning and the feeding behaviour of the WTSE. In addition the home-range size, habitat use and population consequences are computed. We identified the potential sources of lead intoxications for WTSEs being waterfowl such as geese and carcasses of game animals or their remains shot with lead-containing bullets or lead shot. We examined if lead-free bullets perform as well as lead-containing bullets concerning hunting/ killing efficiency. Bullets made of copper or its alloys represent a possibility of hunting that pose no risk of intoxication to humans and wildlife. In a social scientific study the information use of the stakeholders and attitudes of hunters as well as conflicts between social actors are analysed. This knowledge is quickly transferred to the relevant stakeholders. The social scientists also mediate between the different parties involved. Our results, together with field tests by pioneer hunters using lead-free ammunition, show that the use of lead-free ammunition is possible. The process of reducing lead intoxications in wildlife by changing to lead-free ammunition among hunters greatly depends on the involvement of all relevant stakeholders and an information campaign which we tried to realize by producing a leaflet, an internet page and organizing several workshops. So far, lead-free bullets are used in two large hunting associations, and eight forestry districts in four federal states and in one National Park in Germany.

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Persecution of Two Species of Critically Endangered *Gyps* Vultures in Assam, India

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The state of Assam is located in North Eastern India (24°09'-27°58' N, 89°42'-96°01' E). The natural habitats in Assam are tropical wet evergreen rainforest, moist deciduous and subtropical forests and wet alluvial grassland. The climate of the state is tropical monsoon with a hot and wet summer and a cool and usually dry winter. The temperature ranges from 7° (minimum in December to early February) to 38° C (maximum in June to August). The annual rainfall ranges from less than 1000 mm in parts of central Assam to more than 6,000 mm in parts of southern Assam. About 75% of the rain falls during May to September. The populations of three species of *Gyps* Vultures have declined steeply in their range countries in recent years as a result of a veterinary drug (Diclofenac) used to treat domestic cattle. To understand the status and to initiate a long term conservation process for two 'Critically Endangered' Vultures (*G. tenuirostris* and *G.*

bengalensis) found in Assam, a rapid survey was carried out in early 2004 with a more detailed one in 2004-05. These surveys revealed that Vultures are being persecuted in the form of egg collection for medicinal purposes, destruction of nests, cutting and thinning nesting trees for superstitious belief, and killing adult birds and chicks for meat or, for adults, their feathers to make theatrical dresses. In addition, people apparently put chemicals on the skin of dead animals so that Vultures cannot eat them, or poison carcasses of domestic animals such as cattle and goat to kill rabid feral dogs and foxes. Our study revealed that when the population of a widely distributed species declines steeply over large areas and survives only in some small pockets, then local factors such as persecution can become critical to the survival of the species.

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Development of a High Frequency GSM Telemetry Device for Tracking Raptors

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Satellite telemetry has long been the standard for tracking raptors. Currently, these telemetry units are capable of collecting not less than hourly data points for no more than 12-15 points per day. While these units have allowed researchers to track animals across the world and have helped to answer a variety of questions, many questions cannot be adequately answered with such a limited frequency of data collection. Additionally, once deployed, researcher communication with and reprogramming of these units is not possible. To address these problems, we developed a GSM tracking device capable of collecting data at user determined frequencies down to as little as 30-seconds intervals. One additional benefit of this new technology is that it allows for real-time communication with and re-programming of the device post-deployment. Although currently, this technology is limited to tracking animals in excess of 1000g, eventually we will be able to track much smaller species. The fine scale resolution of these new tracking data, not only opens up whole new horizons in the field of telemetry studies, but also allows for, among others, validation and refinement of home range modeling methods. The applications are endless and only limited by the imagination of the researcher. Here, we present data collected from a study tracking Golden Eagles to illustrate the capabilities of this new and exciting technology.

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Raptor Electrocution Rates for a Utility in the Intermountain Western U.S.A.

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We estimated electrocution rates for raptors and common ravens (*Corvus corax*) for the Moon Lake Electrical Association in northeastern Utah and northwestern Colorado, U.S.A. From July 2001–May 2003, we conducted periodic mortality searches at randomly selected distribution line segments and poles, but rate estimates were biased because we were unable to measure scavenging effects for all areas and because sampling intervals (≥3 months between surveys) precluded necropsies on most birds due to advanced decay. From September 2003–August 2004 we conducted monthly searches for dead birds at all distribution poles (N = 3,120) in the Rangely Oil Field (ROF) in northwestern Colorado. The shorter sampling interval more than tripled the number of birds that were suitable for necropsy but >40% of the birds in our sample showed no evidence of electrocution, poisoning, or other trauma.

Golden eagles (*Aquila chrysaetos*) accounted for 63% of dead birds found in the ROF but were removed by scavengers at rates well below hawks and owls (6.8% vs. 55.6%). Minimum and maximum rate estimates for the ROF (0.0059–0.0122 deaths/pole/yr) were lower than all estimates we found in the literature. We compared maximum rates in the ROF in 2003–2004 with rates estimated from a survey conducted at the same poles in 1999 to assess effects of an extensive retrofitting effort conducted from 1999–2003. Electrocution rates in 2003–2004 were 47% lower than those in 1999. Raptor densities in the ROF did not change during our study, suggesting that the reduction was not the result of changes in raptor populations. However, estimates of raptor densities in 1999 were not available and we cannot be sure that numbers of birds using the oil field in 1999 were similar to those in 2003–2004.

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Molt of Honey-buzzard (*Pernis apivorus*) in Africa

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The life-cycle of the Honey-buzzard needs better documentation. Bijlsma (2002) supposed “juveniles would visit more often than adults the central parts of Africa in the northern winter”, but of the 25 historical museum specimens from the DR Congo in RMCA only a minority are subadults (two are in nestling plumage without wing molt, four are second calendar year birds during the northern summer and five are third calendar year birds during the northern spring: these are recognizable by wear of body feathers, which are months longer in place than in older birds). Fourteen are adults (wing and tail molt in progress, November ‘til April). Whereas adult females molt up to four primaries on the breeding grounds, adult males migrate to Africa before any primary molt (Forsman 1999); the few available specimens indicate that, in order to catch up, males have rapid wing and tail molt about December. Furthermore, females depart a bit later than males to the breeding grounds (Bijlsma et al. 1994), so their wing and tail molt in Africa is slower: some continue wing molt till February, and tail molt till April. Honey-buzzards in Africa during the northern summer are second calendar year birds with worn tails starting primary molt quite late (descendant primaries replaced: four in July, two and four in August, eight in September respectively, in four specimens). Therefore, if they likely finish this molt by September-October, they seem fit to migrate to the Palaearctic by next spring (third calendar year). There seems no reason for them to stay yet another summer in Africa, as was supposed by some authors. The opposite, i.e. that second year birds are returning to the Palaearctic, is also not supported by this molt study.

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Intraguild Predation by a European Top Predator – the Eagle Owl (*Bubo bubo*)

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Intraguild predation (IGP) is common species interaction, which on several occasions can drive the structure of ecosystems. Although within vertebrate top predators, IGP seems less frequent, some studies have described this phenomenon. The Eagle Owl (*Bubo bubo*) is one of the most common avian top predators in Europe, and the possible interaction with endangered species is making conservationists consider the possibility of managing Eagle Owl populations. We present here a broad review of IGP by Eagle Owls

based on 41 studies with a complete report of diet for 44 study areas (68,774 prey). We used two levels of IGprey: a broader approach with carnivores, raptors, owls and corvids (IGP4); and a stricter approach without corvids (IGP3). Average IGP4 by Eagle Owls in Europe was 8.4% of the diet; and average IGP3 was 4.0%. Carnivores represented in average 0.8% of the diet, raptors 1.1%, owls 2.2%, and corvids 4.4%. The highest value found for IGP4 was 40.7% and 16.0% for IGP3. The most common IGprey species were Carrion Crow (*Corvus corone*), Eurasian Jay (*Garrulus glandarius*), Tawny Owl (*Strix aluco*), Common Magpie (*Pica pica*), Long-eared Owl (*Asio otus*) and Common Kestrel (*Falco tinnunculus*). We found no temporal variations in IGP or other prey group, even when considering only SW Europe (23 areas). We found no geographic variations in IGP between six regions. IGP was negatively correlated with the percentage of mammals and positively correlated with the percentage of birds. There was no correlation between IGP and Lagomorpha for the whole areas or for SW Europe. Higher IGP was correlated with lower consumption of mammals (mainly rodents), higher consumption of birds (Galliformes, Columbiformes) and higher diet diversity. In conclusion, IGP varied locally, being related to less predation on staple prey groups that led to diet diversification and higher IGP.

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Using PIT Technology to Study Peregrine Demography

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We trapped Peregrines as breeders (n=108), ringed them and their offspring with numbered and passive induced transponder (PIT or microchip) rings to study mortality, dispersal, turnover and recruitment in southern Scotland and north-eastern England in 2002-2009. Most Peregrines bred in the same territories year after year, though some females changed breeding territories. Only one (~5%) was known to occupy the same territory in all years. Mortality of breeding adult females varied between 0 and 33% per annum. The oldest known-age female was 14 yrs old, and the oldest male 17. Peregrine females dispersed a mean distance of 61 km from their natal site to breed (n=18); adult males 40 km (n=11). Some sites showed particularly high turnover rates, probably due to persecution. PIT tagging of peregrines has increased our efficiency of recovering tagged individuals and determining when turnover occurred. PIT tagging using rings requires no special training and has allowed us to build a network of cooperators. Determining the identity of falcons electronically causes less disturbance than physically capturing them.

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Movement Patterns of Long-distance Migratory Subadult Golden Eagles (*Aquila chrysaetos*) in Consecutive Years

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Denali National Park and Preserve, Alaska, (Denali) supports one of the highest densities of nesting Golden Eagles in North America. Encounters of Golden Eagles banded as nestlings in Denali suggested that this population consisted of long-distance migrants that traveled as far as northern Mexico during their first autumn migration. A recent satellite telemetry study revealed a tremendous breadth of migratory patterns among 29 Denali eagles as they moved across western North America during their first year of independence. Here, exceptional transmitter battery life allowed us to examine the movements of four eagles until they were two (n = 1) and three years (n = 3) of age. Given the wide variety of first-year migratory behaviors among the 29 eagles, the second- and third-year movements of these four

individuals were remarkably similar to their first-year movements. Albeit a small sample, these four eagles appeared to have learned from their first and arguably more experimental migration, as evidenced by completing similar migrations more efficiently in subsequent years. Essentially, as the eagles grew older, they tended to wander less and make fewer stopovers during migration. In their second and third years, the individual eagles used winter and summer areas that were similar to those used during their first year, but they generally arrived and departed earlier. These results provide new insights into the ecology of juvenile and subadult migratory Golden Eagles, and are useful for identifying new areas of research regarding migratory behavior of long-lived raptors and for conserving Golden Eagle habitat throughout western North America.

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Supplementary Feeding in Raptors: Apparent Negative Effects on Recovery in a Population of California Condors (*Gymnogyps californianus*)

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Supplementary feeding has been widely used as a management and conservation tool in the recovery of threatened and reintroduced raptor species. Supplementary feeding has been employed to benefit survivorship, breeding success, as well as to reduce predation on livestock and commercially valuable prey species. However, effects on range use and parental care have been little studied. We studied breeding California Condors (*Gymnogyps californianus*) in southern California from 2002-2006 to determine nest success and identify limiting factors for nesting condors. Although hatching success was comparable to the historic wild population of the 1980s, fledging success was extremely low (8.3%). Of 12 chicks hatched in the wild since 2001, only two survived to fledge successfully. All post-hatching mortality since 2002 occurred in the mid to late nestling phase. In two cases, heavy metal toxicosis and complications due to the ingestion of foreign material, principally man-made junk, were the cause of death. All but one chick handled since 2002 held such junk (up to 193.5 g). On average, feeding rates were similar to those at historic nests but were more variable. Most nests had lower feeding rates and more prolonged periods of food deprivation than historical nests. Our data suggest that management, principally supplementary provisioning at single sites, significantly altered foraging behavior with detrimental effects on chick survivorship. Thus, we recommended altering current management to reduce dependence on single provisioning sites to promote the development of more natural foraging patterns. However, this is likely to come at a cost of increased exposure to lead contamination. The recent ban (in effect from July 2008) on lead ammunition in the condor range in California should allow greater flexibility for scientifically driven management of the species recovery.

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Satellite Tracking of Migrating and Wintering Eastern Imperial Eagles (*Aquila heliaca*)

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The Eastern Imperial Eagle is considered as a vulnerable species by BirdLife International. Little is known about its migrations. To our knowledge, adult birds of this species have never been tracked by satellite. Between March 1993 and November 2003 four adult males, two adult females and two immature Imperial Eagles were trapped and fitted with satellite transmitters (PTTs) near Taif in western Saudi Arabia. Most birds returned to the same wintering area year after year. Three of them were trapped there for up to three times. Six eagles were tracked to their summer habitats and in most cases back again to Arabia. Four birds migrated to Russia in

spring, and one to Kazakhstan and one to China. The distances between the summer habitat and the wintering area ranged between 3,900 and 5,000 km. The last adult bird which was trapped was fitted with a GPS tag which made it possible to study its wintering behaviour in great detail. Its wintering home range was 5,900 km² in area with a diameter of up to 127 km. It was most often on the wing between 15:00 and 17:00 hrs (local time). In 2005, five nestling Imperial Eagles were fitted with battery-powered GPS Satellite Transmitters in Slovakia to study their behaviour after fledging. One female from eastern Slovakia which was tracked for one year made the most wide-ranging migration to south-eastern Turkey, later returning to Europe in northern Italy. Another young eagle from western Slovakia migrated to south-western Greece. Two eagles from western Slovakia did not migrate, but dispersed over a large area extending far into neighbouring countries. The eagle with the largest number of fixes from western Slovakia dispersed as far as 282 km to the NNE in Poland and 330 km to the SSE in Croatia.

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Modeling Migratory Flight Characteristics of Eastern North American Golden Eagles (*Aquila chrysaetos*) Using High Frequency Telemetry Data

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A small and potentially genetically distinct population of Golden Eagles breeds in northeastern Canada and migrates through Appalachia to wintering grounds in the eastern US. The topographic features of the Appalachian landscape create a natural migratory funnel which concentrates these birds in a narrow corridor in southern Pennsylvania. Importantly, wind power development is rapidly expanding in this region with hundreds of miles of ridge tops targeted for development. Little to no scientific research has focused on the effect that wind power development might have on migratory birds in this region. To fill this information void, we used newly developed GSM telemetry devices to track Golden Eagles on migration. Data points were collected at 30-second intervals and include location, flight speed, direction and altitude. Using these data, we created fine-scale spatially explicit models of flight altitude and position relative to weather conditions and underlying topography. These three-dimensional spatial models indicate the relative risk of collision with wind turbines at any given point in space within the study area and will be provided to state and local land managers to promote more environmentally responsible siting of wind power facilities.

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Wintering and Dispersal Strategies of Pallid Harriers (*Circus macrourus*) Evaluated from Satellite Tracking

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The pallid harrier (*Circus macrourus*) is a medium size migratory raptor classified recently as Near-Threatened. Basic knowledge on its breeding ecology, migratory behaviour and wintering ecology are currently lacking. To study the migration strategies of this species, we captured breeding birds in north

Kazakhstan and fitted them with solar satellite transmitters. We trapped one female in 2007, and four males and four females in 2008. We present the results of all those birds, making particular emphasis on the following aspects: frequency of occurrence of summer trips, influence of summer-trips on next-year breeding dispersal (between-year breeding mobility), stop-over locations during migration, final wintering locations, duration of the migratory trip, and survival. These represent the first quantitative results of the migratory, wintering and dispersal strategies of this species. We compare the results with those observed in a closely related species, the Montagu´s harrier, and discuss the results in relation to conservation of the species.

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Behaviour of African White-backed Vultures (*Gyps africanus*) in Relation to Land-use and Food Availability

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We investigated changing patterns of land-use in relation to the breeding distribution and foraging behaviour of African White-backed Vultures (*Gyps africanus*; AWbV) around Kimberley, South Africa. Spatial and temporal variation in land-use patterns could affect this important breeding population of vultures, particularly if they favour one land-use type over another. Identifying trends in land-use change is therefore an important part of the conservation management of AWbVs, especially as they may respond negatively to certain land-use changes. Our results for land-use trends over a ten year period indicate a significant increase in game farming and a decrease in traditional cattle and sheep enterprises. Farms with a combined cattle and game operation were significantly larger than other farm types and were associated with land-use activities that positively affect vulture behaviour. Vulture breeding colonies occurred in *Acacia* woodland areas that are associated most with cattle farms and combined cattle and game farms. Food availability, as either livestock mortalities or animals wounded by hunters, was positively associated with vulture activity except on farms with sheep, which had less vulture activity than other farm types. We conclude that the observed increase in area used for game farming can offer potential benefits to the resident AWbV population, particularly on large farms. Determining how land-use associated with private commercial agriculture can affect vulture populations is an important extension to studies of vultures in protected areas.

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When Peregrines Fight: Territorial Advertisement and Defense Behaviour

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Peregrine Falcons (*Falco peregrinus*) on breeding territories have a graded series of advertisement and defense behaviour patterns. Advertisements include in vacuo Patrolling and Prominent Perching, and threats aimed at neighbors and intruders, e.g., Power-Diving and Power-Flying, Bowing, and the loud, shrill Chip-Chip-Chip. Defense usually is sex-specific. A persistent intruder causes threats to escalate to a chase, various aerial attack/defense activities, and sometimes grappling and ground fighting. Serious aerial fighting is extremely dangerous; ground fighting is even more so. Disengagement from ground fighting is difficult before one or both combatants are injured, sometimes fatally. Well observed fights at urban eyries in the midwest U.S.A. from the 1980s to the present were suggested to have arisen from the variety of genetic (migratory and resident) backgrounds of the original released falcons. Studies at Rankin Inlet, Inuvut, Canada, from the 1980s to the present showed that tundra migrants regularly fought for territories upon

arrival in the spring. Urban Peregrines at Edmonton, Alberta, Canada, provided unprecedented opportunities for observing fights when late-arriving breeders carrying satellite telemetry encountered opponents which had been on the territories for 2-3wks. A mostly-resident, marine, breeding population in British Columbia, Canada, had fights at various times in the year, including at spring arrival of the few migrants, and at mid-incubation followed by a new clutch laid by the new owner. Occasional heavy winter mortality of resident breeders appears to select for the mixed strategy of some residents and some migrants, despite the cost of fights to retain territories. Similarly, occasional lethal spring weather may select for a mixed migratory strategy with some early and some late arrivers despite the serious fights that may arise. Forty years ago, Peregrine fights were thought to be extremely rare events; today we think they are regular events in healthy populations.

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Territory quality and breeding success in sparrowhawks (*Accipiter nisus*)

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In Sparrowhawks, as in some other birds of prey, not every available nesting territory is occupied every year. Over a period of years, some territories are occupied more often than expected by chance at the population levels found, and others less often. Annual breeding success is also generally better on those territories that are used most often. Among Sparrowhawks in south Scotland, good territories produced, on average, more young per nesting attempt than were needed to offset the average annual adult mortality, so acted as 'sources' of birds able to colonise other areas. In contrast, poor territories produced fewer young per attempt than were needed to offset the average annual mortality, so acted as 'sinks'. Studies of the year-to-year territory changes made by individual Sparrowhawks in the study area suggested that potential breeders competed strongly for the best territories, and that subordinate birds were relegated to poorer territories. Good nest success probably resulted from a combination of a good bird in a good territory, rather than from territory quality or bird quality alone. The study shows the importance of top quality habitat to maintaining population level, for the presence of poor habitat alone could lead to gradual decline and local extinction.

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Restoration of Breeding Bald Eagles (*Haliaeetus leucocephalus*) in the Northeast United States, a Three Decade Summary

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Bald eagles were virtually extirpated in 10 of 13 Northeastern United States by 1970, largely due to habitat alteration, indiscriminant killing, and environmental contaminants. With the passage of the US Endangered Species Act in 1973, the banning of DDT in 1972, and a burgeoning environmental consciousness, restoration of bald eagles became a priority in many areas of the US and particularly in the Northeast. Four Northeast states, Massachusetts, New Jersey, New York, and Pennsylvania, took the lead in this effort setting up active translocation and release programs, releasing by hacking nearly 1000 nestling bald eagles over a 15yr period. While early on, the hacking of bald eagles was very much an experimental effort, early results proved the technique efficacious, and the subsequent survival of released eagles and regrowth of the breeding population has been nothing short of remarkable, with pairs of breeding eagles rising from single digits to many hundreds over this time. Along the way, with a large, marked population of released eagles and their progeny, unique information on survival, movements, and nest-site establishment have been gleaned, as well as a refined "recipe" for the successful release of bald eagles by hacking.

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Juvenile White-tailed Sea Eagles' (*Haliaeetus albicilla*) Movement Patterns at Smøla Wind-farm in Norway Determined by Satellite Telemetry

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Juvenile White-tailed Sea Eagles have been studied at Smøla, Western Norway since 2003 in connection with the establishment of a wind-farm at that site. In total, 28 fledglings were satellite-tagged 2003-2007. From August 2005 to April 2008, three of these have been killed by turbine-blades at the site out of 18 kills in total, involving 12 adults and six juveniles. One satellite-tagged bird was killed slightly after fledging, while the two others were killed the next spring. Both sexes stayed within the general area during the first winter. A general return movement to the natal area was observed in both males and females both in the first and the second spring (March-April). Females dispersed further than males, often more than 800 km during summer, generally to the north, but returned during winter. This seasonal pattern seemed repetitive. The findings are discussed in the context of risk assessment related to wind-farm developments along the Norwegian coast. Studies are currently being expanded by means of bird radar and the use of DNA techniques to reveal possible long-term impacts on the population.
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An Exception to the Rule: The Fast Growing Tree-nesting Bonelli's Eagle (*Aquila fasciata*) Population of Southern Portugal

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In Mediterranean Europe the Bonelli's eagle went through a sharp decline in the recent past, Portugal included. Currently, the situation is generally improving, showing signs of recovery in several formerly declining populations and holding stability in others. Yet, some continue loosing numbers at steady rates. A few populations are slowly increasing, but none has shown such a fast rate of increase as in the southern end of Portugal. There, numbers doubled in 15 years, from 21 known in 1992 to 48 in 2008. The increase is factual and not due to a better coverage of the area as a systematic survey has been regularly carried out throughout the years. This population ranges across two distinct neighbouring natural units: to the West an extensive area of highlands covered by dense scrub and patchy cork-oak (*Quercus suber*) woodland and forest, with large eucalyptus plantations in some areas; to the East a rather flat plateau almost steppe-like, with scattered eucalyptus or evergreen-oak (*Quercus rotundifolia*) groves. Human population is low, predominantly scattered in the highlands and concentrated in the lowlands. All eagle pairs currently nest on tall trees as an exception to the rest of Europe and most of the Mediterranean. Historical records and genetic analysis have shown that this population has risen from a few founding pairs at the first half of the XXth Century, when most of the land had been cleared for cereal production, leaving little space for breeding Bonelli's eagles. The extensive rural abandonment that began around the 1950's and intensified thereon, with subsequent renaturalization, increasing tranquillity and the growing of tall trees, allowed the steady range expansion observed. The increase started by the filling of gaps in distribution, followed by the spreading out to the peripheries and eventually the exporting of breeders to the sparsely populated areas farther north.

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Establishing a Captive Breeding Programme in Response to the Asian Vulture Population Crisis: Difficulties and Solutions

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Until the 1990s, Oriental White-backed, Slender-billed and Long-billed Vultures found in South Asia were extremely abundant; however by 2002 all three species were red-listed 'Critically Endangered' and close to extinction. The population crash has been dramatic, possibly the most significant loss of population to a species yet known. Now less than 1% of the population remains. The cause of this huge population decline was established as Diclofenac, which started use as a veterinary painkiller in South East Asia in the mid 1990s. Although it is seemingly impossible to have lost so many birds for one sole reason, models showed that less than 1% of livestock carcasses would have to carry lethal concentrations of Diclofenac to have caused the population declines in India and Pakistan between 2000 and 2003. In January 2004 a manifesto was produced by the international groups working with the vulture decline. Two recommendations were made:
(1) that government authorities in all range states introduce legislation to prevent all veterinary uses of Diclofenac that pose a risk to vultures, and
(2) That captive populations of all three affected *Gyps* species be established immediately in South Asia, for the purposes of breeding and reintroduction to a Diclofenac-free environment.
The plan proposed five breeding centres within the birds' ranges, each centre holding twenty five pairs of each of the three species. Although not yet at capacity, five breeding centres are now in existence: Nepal breeding centre with fourteen birds; Pakistan 11 birds; India has three centres holding 184 birds. Surprisingly, considering the young age of many of the vultures, two chicks were successfully produced from two pairs of Oriental White–backed Vultures at Pinjore in India, this year. The problems of such a massive project are challenging, issues have included the housing of adults and juveniles together, colony vs individual housing, and the amount and quality of available food sources.

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Remedial Action for Critically Endangered Vultures in India

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Three species of vultures (*Gyps*) endemic to South and South-East Asia are listed as Critically Endangered because of rapid population declines in the Indian subcontinent. The main cause of these declines is poisoning by the veterinary drug diclofenac, which is ingested by vultures that feed on the carcase of a domestic ungulate treated with the drug shortly before death. Remedial action in India to prevent the extinction of these species includes the removal of diclofenac from the vultures' food supply and captive husbandry and breeding. Actions to reduce the risk from diclofenac include restrictions on the manufacture of veterinary diclofenac, awareness campaigns for farmers' organizations, pharmacists, veterinarians and government officials and safety testing to identify alternative drugs that do not harm vultures. Research has so far identified one drug, meloxicam, which does not harm vultures at the maximum likely exposure level. Studies are being done to identify barriers to its rapid uptake by livestock farmers. A monitoring program has estimated the proportion of domestic ungulate carcasses contaminated with diclofenac and how this has changed since the ban on manufacture of veterinary diclofenac. The availability and provenance of diclofenac offered for sale for veterinary use is being measured by visits to veterinary pharmacies. The prevalence of diclofenac in cattle carcasses has not yet fallen since the ban, and the drug remains widely available for use on livestock. Monitoring of vulture populations shows that they remain low. No species are recovering and one continues to decline rapidly. Additional action is needed to remove diclofenac from the birds' food supply.

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Releasing and Monitoring of Bearded Vulture (*Gypaetus barbatus*) in Andalusia: LIFE NAT/ES/000056

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Since 2004 Gypaetus Foundation has developed the LIFE project "Actions for the reintroduction of the Bearded Vulture (*Gypaetus barbatus*) in Andalusia". Within the framework of this project, Bearded Vultures have been released and monitored. The release site is located in a protected area in north east Andalusia, Spain (Mediterranean biogeographical region). Birds are released with a hacking technique yearly in May, in an area selected by feasibility studies. Released birds come from a network of breeding centres. Bearded Vultures are released when around 90 days old. Fundamental monitoring activity during hacking is distant direct observation during daylight hours. Additional observation is carried out with cameras located inside the release cave. The hacking period lasts 30 days, without direct human contact, until birds are able to fly and is followed by 60 days more of intensive monitoring. Food is provided before dawn, to avoid birds identifying humans as food source. Colour coded rings were attached and specific feathers were discoloured to allow individual identification. Satellite transmitter devices were also attached. Once out of the hacking area, monitoring is mainly implemented by GPS locations. A Social Participation Campaign allows us to collect sightings from birdwatchers and to know about the physical condition of the birds. Up to 2008, nine birds have been released (5 males, 4 females). One female was found dead (shot) last April. Birds start to fly efficiently two weeks after the first flight, and are able to find food afterwards. The daily presence of the birds in the hacking area lasts around 4 months, and becomes sporadic after the fifth month. Long distances movements take place in the second year of life. Around 1000 locations per year are received for each bird. Monitoring allows prioritizing of the areas to implement preventive measures against threats. The results show than the methodology is suitable to produce self-sufficient individuals.

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Systematic Monitoring of Spring Raptor Migration at Dadia National Park, Greece, from 2003 to 2005

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Migrating raptor species and Black Stork (*Ciconia nigra*) were studied at Dadia National Park, NE Greece, during spring 2003, 2004 and 2005. Covering the whole National Park from 24 vantage points, we systematically sampled and mapped the flights of the migrating birds, in order to 1) monitor the number of passing individuals per year, 2) evaluate the migration phenology for the most frequent species, 3) detect optimal migration spotting points in the study area, and 4) characterize the direction of the migrating raptor populations. In total, we counted 23 migrating species and 2030 migrating individuals, out of these 715 Common Buzzards (*Buteo buteo*), 547 Black Storks, 136 Short-toed Eagles (*Circaetus gallicus*), 124 Sparrowhawks (*Accipiter nisus*), and 114 Honey Buzzards (*Pernis apivorus*). The numbers for some species fluctuated considerably during the three year study period, but there was an overall decline from 739 individuals in 2003 to 662 in 2004 and 629 in 2005. Analyzing the phenology of the passage through Dadia NP for the 12 most frequent species, we detected peaks at the second decade of March for the Common Buzzard, at the third decade of March for the Short-toed Eagle, the Black Stork and the Sparrowhawk, at the first decade of April for Marsh Harrier (*Circus aeruginosus*), Northern Harrier (*C. cyaneus*) and Lesser Spotted Eagle (*Aquila pomarina*), and at the first decade of May for Levant Sparrowhawk (*Accipiter brevipes*), Red-footed Falcon (*Falco vespertinus*), Honey Buzzard, and Hobby (*Falco subbuteo*). Most of the raptors could be detected at the Eastern vantage points close to the river Evros, an important migration route for many species. The mean direction of passing raptors was 359°. Due to the dominating direction of south towards north, we can assume that most of the migrating raptors detected at Dadia NP crossed at the strait of Dardanelles.

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Nest Cameras as a Tool for Habitat and Population Management of Bonelli's Eagle (*Aquila fasciata*)

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For six years the reproduction of four pairs of Bonelli's Eagles (*Aquila fasciata*) that breed in nature parks in the region of Catalonia, Spain, has been monitored with nest cameras. Spain, with 75% of the European population of Bonelli's Eagle, holds a delicate stronghold, and in Catalunya the species is in steep decline. Park and wildlife authorities manage six nests, which constitute 10% of the Catalan population, and they are integrating the results from this research into different aspects of this species' regional conservation management. The most intense part of the breeding season spans for six months and it can provide over 1,370 hours of useful footage, which is stored and analised. Analisis of the data collected has provided valuable information on the breeding biology of the species and the differences in parental roles in nest building, incubation and chick feeding, as well as interesting insights in the growth and development of chicks, both physical and behavioural, and on prey delivery and feeding habits. More importantly, the results on matters that directly relate to the conservation of the species during breeding season such as stress, nest disturbance and prey availability are then integrated on the long-term ecological studies and management of the nature parks. Also, the real-time monitoring of the nests allowed the detection of certain incidents that were addressed with immediate, specific actions, taken by the wildlife authorities, which resulted in an increase of the population's overall breeding success. Using the results of the research from four Bonelli's Eagle's nests during the breeding season of 2007-2008 as a case study, this paper examines the advantages and problems related to the use of nest cameras as a tool for short and long-term management of this species, applicable for both hands-on approach and a broader range of conservation measures.

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Another Piece of the Puzzle in the Grey-Faced Buzzard (*Butastur indicus*) Migration Story

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Grey-faced buzzards (*Butastur indicus*) breed in NE China and Japan. They migrate in large flocks in East Asia and pass through Taiwan in autumn and in spring. Ringing data showed that birds caught in Ryukyu Islands, Japan and southern Taiwan wintered in the Philippines. Radar images from southern Taiwan showed that flocks of Grey-faced buzzards returned from the Philippines in the spring. Satellite tracking found birds breeding in Japan wintered in the Ryukyus. This study hopes to learn where Taiwan's Grey-faced buzzards winter, breed, and their migration routes. Ground counts at Kenting Taiwan showed that north-bound Grey-faced buzzards arrive in several peaks between March and May, suggesting different wintering populations in SE Asia. Our satellite tracking of 3 birds tagged in Kenting in October showed that they wintered on different islands of the Philippines. In spring, Female A headed to Kuangtong China directly from Luzon in late April, then made her way to China/Russia border, before doubling south to breed north of the China/Korea border. Male B passed through Taiwan in late March, crossed over to China near the narrowest point of the Taiwan Straight, and eventually settled north of Pyongyang, North Korea via Shangtong Peninsula, China. Female C died in the ocean north of Luzon on her way north. The two males caught in March at Changhua, Taiwan crossed Taiwan Straight and followed pretty much the same route as Bird B to Shantong. Male D died in the Yellow Sea when crossing over to Korea Peninsula. Male E settled in northern North Korea near China border presumably to breed. Future tracking and increased sample sizes should shed light on whether birds breeding in north Korea follow the same migration routes in autumn and in spring, and whether the different routes taken by Female B is a sexual or populational trait.

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Contemporary Conservation Status of the White-bellied Sea Eagle in Australia: A Tale of Many Scales

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Considered to have a declining world population, concern has been expressed in recent years over the conservation status of the White-Bellied Sea-Eagle (*Haliaeetus leucogaster*) within Australia. Although widespread, regionally it is thought to be declining in response to human induced disturbance. We used mitochondrial control region sequence data and the Australian Bird Atlas data to investigate the current genetic and spatial distribution of the species at the continental level and within and between specified regional units. At ecological timescales the Atlas Data was used to identify the extent and pattern of change in range and density of the species between three Atlas Periods (1901-1976, 1977-1981, and 1998-2001) using a new standardized frequency measure, the Occupancy Index (OI). Sequence data were obtained from 128 individuals describing 15 haplotypes. Overall, genetic diversity was low and although there were regional differences, AMOVA results failed to provide any significant level of genetic subdivision. We suggest that the population expanded from a bottleneck approximately 160,000 years ago during the late Pleistocene, and spread throughout the continent through a contiguous range expansion. At the continental scale, there was no significant difference in the spatial extent of occupancy between Atlas Periods. However, there were considerable changes in frequency and range extent between defined regions, and there were distinct differences in the pattern of change in OI between coastal and inland areas over time. The over-riding factor associated with distributional shifts and frequency changes was apparently El Niño driven climatic fluctuation. It is clear from the combined analyses that there are signatures of both historical and contemporary processes effecting the current distribution, and that the high level of genetic exchange between regions bodes well for the long-term survivorship of the species within Australia. This study reinforces the importance of multi-scale analyses both temporally and geographically.

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Red Kites in Scotland: Flying in the Face of Persecution?

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The reintroduction of Red Kites (*Milvus milvus*) to the UK has been a phenomenal success story. However, not all populations are increasing at the same rate. In North Scotland, the population has reached only 35 pairs after 15 years whereas the Chilterns population has increased to over 300 pairs over the same timescale. Clearly, there is something limiting

the population size of the North Scotland kites. Preliminary analyses of the kites found dead during the period when the population growth had halted estimated that 42% of all birds in North Scotland had been illegally poisoned. This estimated high level of persecution coupled with the poor population growth in North Scotland prompted this study. The intensive monitoring of nests and the use of wing tags and radio transmitters to follow individual kites means that breeding success, survival and the causes of mortality are known for several populations. We use these data to model and compare the population dynamics of six kite populations in Scotland and England to determine whether poor breeding success or poor survival linked to persecution is limiting population size in North Scotland. Analyses such as these are critical for establishing effective conservation strategies. Our results should allow targeting of research and conservation resources to the appropriate stage of the life cycle and present opportunities to reverse the fortune of the North Scotland kites.

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Movement Dynamics of Golden Eagles in Western North America as Determined by Satellite Tracking

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From 1999–2007, I deployed primarily battery-powered satellite transmitters (PTTs) on 31 Golden Eagles (*Aquila chrysaetos*) captured at five ridgetop, autumn-migration study sites in the western United States. The eagles included 5 females (3 juveniles, 1 subadult, and 1 adult) and 26 males (21 juveniles, 5 subadults, and 1 adult). Fourteen (45%: 11 juveniles, 2 subadults, and the adult female) were confirmed dead before their transmitter batteries failed and four other mortalities were likely, most occurring within 1 yr. Two birds were electrocuted on power poles; another bird was found with a rock pinning its head to a hillside! Ten transmitters ceased operation unexpectedly within 6–21 mo (expected minimum: 24 mo), two due to confirmed equipment failure, with all PTT sensor and movement indicators positive at the time. Two units transmitted from live birds for 31.5 and 53.5 mo, and one bird/transmitter was still active after 32.5 mo in July 2008. The tracking data suggest three major themes: 1) highly migratory northern birds may initially travel diverse pathways southward, but generally converge in the central and southern Rocky Mountains to reach “popular” winter ranges along the interface of the Great Plains and southern Rocky Mountains; 2) samples from most study sites confirm a mix of wandering, regional residents and more conventional “north-south” migrants, but most of 12 birds outfitted in New Mexico proved to be long-distance migrants from northern latitudes, whereas most of 13 birds outfitted in Nevada proved to be Great Basin/Intermountain residents; and 3) many young eagles, especially those tracked in the Great Basin, wandered extensively during winter, if not throughout the year, and those tracked for multiple annual cycles typically exploited a variety of winter and summer ranges. The results have distinct implications for understanding the species’ conservation needs and developing effective population monitoring programs.

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Raptor Population Index Project: A Model for Continental Coordination of Raptor Migration Monitoring

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The Raptor Population Index (RPI) Project (http://rpi-project.org), initiated in 2004, is a collaborative effort designed to facilitate continental coordination of raptor migration monitoring in North America. In this

presentation, we profile the RPI Project as a model effort with potential for guiding development of similar efforts around the world. Primary partners on the project include three leaders in the field of raptor migration science: Hawk Mountain Sanctuary – managers of the world's longest-running raptor migration count and research program; HawkWatch International – managers of a broad network of migration monitoring and research sites in western North America and around the Gulf of Mexico; and the Hawk Migration Association of North America – the primary umbrella organization involved in supporting the continent's largely volunteer-driven network of raptor migration counts. The RPI Project is further overseen by a Science Advisory Committee that includes representatives from several government agencies, academia, and other conservation organizations. The principal goals of the RPI Project are to: 1) enhance and maintain a centralized electronic database of North American raptor migration counts, including a web-based interface for data entry, managed data access, project profiles, data summary tools, and status and trends reporting (http://hawkcount.org – currently including data from more than 100 sites in 31 states, 4 Canadian provinces, and Veracruz, Mexico); 2) produce statistically defensible indices of annual abundance and trends for the majority of migratory, diurnal raptor species in North America based on migration counts from as many locations as possible; and 3) develop and maintain a standardized system for regular reporting and broad dissemination of population trends and conservation status assessments for migratory raptors in North America. In June 2008, the first major synthesis product arising from the project was released: a new book entitled *State of North America's Birds of Prey*, published by the Nuttall Ornithological Club and American Ornithologists' Union.

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Demography of an American Kestrel (*Falco sparverius*) Population

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We studied reproduction of marked American Kestrels nesting in boxes in southwestern Idaho, USA from 1992-2006, and results provide new insights about the life history and demography of a common North American raptor. Immigrants outnumbered philopatric birds in the nesting population. Only a small fraction of the kestrels we banded as nestlings returned to nest in the study area. Males were more likely to return than females, and individuals that hatched earlier in the year were more likely to survive and return the next breeding season than later hatching birds. Most known-age kestrels nested in their first year of life. There was no apparent reproductive advantage to delayed breeding. The number of years that kestrels nested ranged from 1 to 6 years, with most nesting in only 1 year. Individuals that nested successfully and males that were locally produced were more likely to nest in multiple years. Age-related differences in reproduction were related mainly to differences among individuals and were probably related to the disappearance of less productive birds that had dispersed into the study area. Although kestrels have relatively short lifespans, their lifetime reproductive output was similar to that of longer-lived raptor species. Approximately 25% of nesting kestrels never produced young, and only 22% produced half of all fledglings. Local lifetime production was higher for males that we banded as nestlings than for males we banded as adults. Young that returned to nest in the study area were produced by relatively few lineages. Natal dispersal distances of males correlated closely with those of their fathers; offspring of locally produced kestrels were twice as likely to be recruited into the local nesting population as fledglings produced by kestrels of unknown age and origin.

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Mechanisms and Functions of Carotenoid and UV Colouration in Nestling Montagu's Harriers (*Circus pygargus*)

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Plumage and integument ornamental colouration produced by carotenoid (i.e. pigmentary colouration) and ultraviolet (UV) reflectance (i.e. structural colouration) have received particular attention in birds. Both signals have been shown to play key roles in social and sexual signalling in birds and to be indicator or individual quality. However, while elaborate carotenoid and UV-based traits in adult birds may have evolved as honest signals of individual quality in the context of sexual selection, the functions of such traits in chicks are less well understood. Many raptor species present both carotenoid-based and at least for Montagu's harrier, UV-based bare parts colouration which are used by adults as sexual signals during mate choice. In this species, nestlings are already coloured very early in their development but functions associated to such colouration remained widely unknown. In this study, we experimentally investigated both mechanism and function associated to nestlings' colouration, by using carotenoid supplementation, UV-blocking filter and spectrophotometry.
In our study area (central-western France, Deux Sèvres) Montagu´s harrier specialise on voles (carotenoid-poor prey), but this preferred prey exhibit extreme inter-annual variations in abundance. We found that in the field, nestlings were limited in carotenoid, becoming more coloured with carotenoid supplementations whatever their preferred prey abundance. However, chicks showed colour variations in relation to vole cycles: on peak vole years, nestlings feed mostly on voles and were in better condition but less coloured, whereas on crash vole years, when this prey is scarce, they have a more diversified diet and were in less good condition but more coloured. We also found that carotenoid and UV were related in nestlings colouration and served as signals for parents-offspring communication during feeding allocation: nestlings less coloured (i.e. without carotenoid supplementation) and with no UV reflectance were under nourished. In addition, carotenoid and UV signals acted differently between nestling sex.

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Communal Roosting Recruitment in Marsh Harrier (*Circus aeruginosus*): Mechanisms and Individual Investment

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Group living is associated with costs, such as competition for food, but also with potential benefits, such as a decrease in predation risk. For example, earlier predator detection and/or higher defence efficiency has been found in groups. Recruitment and mobbing are widely conceived as anti-predator strategies involving in group defence, and have mainly been investigated at an interspecific level and in relation to group size. Conversely, very few studies have evaluated individual investment in mobbing group and individual characteristics of mobbers. In this study, we experimentally tested communal roosting group defence of Marsh harrier *Circus aeruginosus*, a medium-size raptor roosting on the ground, rendering it potentially vulnerable to predation. We assessed experimentally, by using predator decoys varying in dangerousness, whether communal roosting enhanced predator defence. More especially, we focused on mechanism and specific behaviours involving in recruitment and whether individual investment in terms of defence was associated to specific characteristics of individuals, such as sex or plumage colouration. We made 140 such tests. Briefly, we found that in this species, group defence was restricted to communal roost and was modulated by predation risk mainly through alarm calls. In addition, we showed that mobbing initiator and recruits differed by their sex and their feather characteristics, suggesting that individual characteristics such as plumage colouration may influence individual behaviour.

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Non-breeding Period Observations of a Marked Population of Urban-nesting Cooper's Hawks

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From 1996 through 2007, we colour-banded 1,312 (662 males, 650 females) Cooper's Hawks (*Accipiter cooperii*) on their nest sites in an urban study area on southern Vancouver Island, British Columbia, Canada. Each year we solicited observations of these marked hawks from the general public. From August 1996 through March 2008, we received a total of 884 non-breeding period observation records where, at a minimum, the band colour was noted and thus the sex could be determined. Included among these observations were 134 records of marked hawks with prey. Although the sexes were banded in nearly equal proportion, males were encountered (687 records) significantly more often than were females (197 records). Male Cooper's Hawks were also recorded much more frequently near bird feeding stations. Prey records showed a large prey overlap between the sexes but also indicated females took proportionally larger quarry and more mammals than did males.

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Diet Specialisation and Foraging Efficiency Under Fluctuating Food Abundance in Sympatric Harriers

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Specialist species (using a narrow range of resources) are predicted to be more efficient when foraging on their preferred food than generalist species (consuming a wider range of foods), but this hypothesis has rarely been tested on vertebrate predators. We tested whether foraging efficiency of Pallid harriers (*Circus macrourus*), a vole specialist, and sympatric Montagu´s harriers (*C. pygargus*), a closely related generalist species, differed in relation to interannual variations in vole abundance. We collected foraging observations of both species (including strike rate and capture rate) over three years (including two vole peak years and a crash year) in north Kazakhstan. We also collected diet data from pellets and nest observations. Confirming our hypothesis, pallid harriers had a higher hunting success (a higher proportion of successful strikes, and overall a higher capture rate per hour) than Montagu´s harriers on years of high vole abundance. These years, they also had a higher proportion of voles in the diet than Montagu´s harriers. In contrast, we found that hunting success of pallid harriers was worse than that of Montagu´s harriers when voles were scarce (when diet data showed that they hunt alternative prey, mainly passerines). This may explain why it is more efficient for such a specialist to move to a different area rather than to stay in an area where the main prey is too scarce, even when alternative prey are abundant. Indeed, we found that breeding density of pallid harriers in the low vole year was extremely low, but also that the few pallid harrier pairs remaining to breed were all unsuccessful, an opposite pattern from that observed in the Montagu´s harriers, which maintained a stable breeding density and success despite variations in vole abundance.

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Using DNA to Monitor Turnover and Survival of Golden Eagles (*Aquila chrysaetos*) in Scotland

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The UK has the fourth largest golden eagle (*Aquila chrysaetos*) population in Europe, with approximately 430 pairs occupying territories. Demographic monitoring of the UK golden eagle population, primarily involving productivity and distribution of occupied and vacant territories, has been achieved by censuses every 10 years and annual surveys of approx. 200 occupied territories are undertaken by members of the Scottish Raptor Study Groups (SRSG). Whilst these surveys are important for monitoring the UK golden eagle population, they are limited because individual eagles cannot be confidently recognised and information on turnover in the breeding population is lacking. Recent modelling has suggested that the Scottish golden eagle population may be close to decline, with persecution the principal national threat. To overcome this research gap, since 2006 we have been using non-invasive genetic sampling to monitor the presence of individual eagles over time. With the support of SRSG members, and others, we have collected moulted adult feathers and mouth-swabbed nestlings for DNA sources in over 200 golden eagle territories, the largest known golden eagle DNA sampling effort in the world. We discuss the results from the first three years of the study.

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Modeling the Electrocution Risk of Raptors in Powerlines and Evaluating Mortality Rates at Corrected Pylons

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Bird electrocution on powerlines is one of the main causes of mortality for many raptors inhabiting the Mediterranean ecosystems, and also is an important conservation problem concerning endangered species like the Bonelli's Eagle (*Aquila fasciata*). In order to mitigate this problem, a study was set in an area located at the Barcelona Pre-littoral Mountains (northeast Spain). First, we developed a predictive model to detect pylon typologies that were responsible of the electrocutions. 15.323 pylons were characterized according their technical features and environmental variables of surrounding habitat. Additionally, a sample of these pylons was surveyed in order to detect carcasses of electrocuted birds. Using all of these data, the electrocution risk rate was calculated for each pylon. The results allowed classifying pylons in different categories of correction priority. We estimated that the correction of 6% of pylons included at the maximum category of priority would involve a 70% reduction of mortality. This information was supplied to power companies in order to optimize the effectivity of correction works. Between 2001 and 2007, 813 pylons were corrected. In order to evaluate the effectiveness of these practices, we compared the mortality rates obtained on a sample of pylons, before and after the application of correction measures. Mortality rates were significantly lower after the correction of pylons. We also used a control sample of non corrected pylons in order to compare the mortality rates variation in the study area between the two prospecting periods. In this case we did not find significant differences. In consequence, we consider that the methodology developed could be an important tool to apply in conservation plans directed to mitigate bird electrocution.

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Using Long-term Surveys of Raptor migration in the French Pyrenees as an Indicator of Global Climatic Change: First Results

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Long-term studies on visible bird migration are often used to improve knowledge about the biology of migration, such as timing, as well as to monitor long term changes in population. With the recent concern about the effects of global climatic changes on biodiversity, a new field of investigation has developed. Organbidexka Col Libre, a French N.G.O., has studied postnuptial raptor migration across the western Pyrenees in France since 1981, using a standardized protocol. This study shows a significant change in the migration patterns of trans-Saharan raptors, which are migrating earlier, whereas those of non-trans-Saharan raptor remain unchanged. For species in which 80% of migration occurs in about one month, significantly earlier timing of migration has been observed.

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Steller's Sea Eagles (*Haliaeetus pelagicus*) in Magadan District, Russia Over the Past 18 Years

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We studied occupancy and productivity of Steller's sea eagles (*Haliaeetus pelagicus*) in the Magadan District of Russia since 1991, concentrating mostly on the Magadan State Reserve (zapovednik) and the coastal areas nearby. We were aware of and visited at least once during the study period 281 nesting territories. We were unable to visit all nests in all years, but since 1997 we have collected data from about 100 nests per year. Nesting territories could be divided into sites on rivers or sites on coasts and those which fell within the more strictly protected areas of the zapovednik and those outside of its boundaries. Coastal sites could be along shallow bays with large littoral mudflats at low tide or along areas of deep water with little or no littoral zone. Some coastal nesting territories were near sea bird colonies. We report on occupancy and productivity parameters and examine the influence of territory characteristics on these. Overall productivity was significantly less on rivers than on the coast. On the coast, nests on shallow bays and near sea bird colonies were more often occupied and were more productive than territories on deep water. We discuss our findings in relation to current estimates of the status of the Steller's sea eagle and identify useful avenues of research as well as conservation efforts that might benefit the eagles.

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Widespread Hybridisation of the Greater and the Lesser Spotted Eagle in Europe: A Genetic Study

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The Greater Spotted Eagle *Aquila clanga* is a globally vulnerable raptor species whose European population is threatened by the hybridisation with the Lesser Spotted Eagle *A. pomarina*. Thus far interbreeding has been detected mostly by field observations and morphological analysis. We applied a large set of autosomal genetic markers (8 intronic single nucleotide polymorphism (SNP) markers and 23 microsatellite markers) in order to assign 750 spotted eagle individuals (from 400 breeding territories) from 14 European populations to species, F1 hybrids or backcrosses, and estimate the distribution and frequency of hybridisation. We detected asymmetrical hybridisation, prevalently between *A. pomarina* males and *A. clanga* females, in all studied sympatric populations. There occurred also introgression due to the backcrossing of F1 hybrids to the parental species, which in most cases was the more common *A. pomarina*. The frequency of hybridisation, as well as introgression, is relatively high compared to the low numbers of endangered *A. clanga* in Europe. Monitoring of a mixed population in Estonia during ten years demonstrated abandonment of *A. clanga* breeding territories and replacement of *A. clanga* pairs by *A. pomarina* pairs via temporary hybridisation. Total number of *A. clanga* x *A. pomarina* territories in Estonia was twice as high as this of *A. clanga* pairs whereas annual frequencies were approximately equal, which suggests higher turnover rate in interbreeding pairs. Annual share of backcross nestlings was two times smaller than this of F1 hybrids possibly indicating lower fertility in hybrids. Current study shows that interspecific hybridisation poses an important threat for the *A. clanga* in Europe and may contribute significantly to the extinction of local populations.

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Dispersal of Insular Caribbean *Buteo* Hawks: Ecological Constraints and Conservation Implications

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Raptors are important components of upland ecosystems of tropical islands. Forest raptors of the West Indies represent either subspecies of continental forms or endemic species closely related to mainland species. The process of tropical oceanic island colonization by raptors and the consequent loss of migratory ability and restricted dispersal are poorly understood. The Broad-winged Hawk (*Buteo platypterus brunnescens*) is an endemic and endangered subspecies of upland montane forests of Puerto Rico. The Red-tailed Hawk (*Buteo jamaicensis jamaicensis*) breeds in all life zones of Puerto Rico. We studied movements of adult and juveniles of both species in the moist karst forest of north-central Puerto Rico. We captured and radiomarked 19 Red-tailed Hawks and 8 Broad-winged Hawks in the Rio Abajo Forest region. Home ranges of adult Red-tailed Hawks averaged 254.8 ha (SE = 71.9 ha) and Broad-winged Hawks averaged 106.6 ha (SE = 31.4 ha). Dispersal of juvenile Red-tailed Hawks averaged 4805.8 m (SE = 677.1 m) and was greater than the maximum distance recorded for a juvenile Broad-winged Hawk (2976 m). However, movements and dispersal of insular forms of the Red-tailed Hawk and Broad-winged Hawk were considerably smaller than for mainland conspecifics. We suggest restricted dispersal of forest raptors in the West Indies may be a direct result of selective pressured imposed by insular conditions. However, further research is required on the endemic forest raptors of the insular Caribbean to verify the sedentary nature of these local forms, investigate juvenile dispersal mechanisms, and determine the role restricted dispersal may play in the biogeography of Caribbean birds of prey.

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Understanding Density Dependent Processes in Golden Eagle: 35 Years of Recovery in the Italian Alps

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Density-dependent processes cover different mechanisms with the ultimate consequence of regulating population growth rate. Detecting such processes and their underlying properties is a difficult task, requiring a large dataset covering a period where density significantly increases/decreases in order to reach population regulation's threshold. Large raptors are interesting biological models to test density dependence patterns since *i)* most of them are territorial and territories once occupied, are almost always reused and *ii)* their populations have underwent a severe decline during the XXth which have drawn the attention of scientists and conservationists, allowing efficient protection and subsequent population recovery, and monitoring. Once an effect of the density of territorial pairs on productivity is detected, the mechanism(s) involved still need to be explored. The Habitat Heterogeneity Hypothesis suggests that the decrease in breeding parameters over time (leading to negative density dependence) is the consequence of poorer quality territory being more and more used. Conversely, the Individual Adjustment Hypothesis suggests that a decrease in productivity is the result of interference competition and/or depletion in food abundance. Here we used an exceptional data set on the Golden eagle in Italy. Data were collected by two of the authors (L. and P. Fasce, with collaborators) during 35 yrs on a recovering population of the Eagle, which started with 9 pairs in 1973 and ended with 139 pairs in 2007. Data were available on fecundity parameters, occupancy rate, and spatial distribution of each territorial pair. We test the predictions of the two contrasted hypotheses using demographic data (number of breeding and non-breeding pairs, % of laying pairs, productivity) and spatial data (nearest neighbour distance, local and regional density, habitat quality).

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African Fish Eagle *Haliaeetus vocifer* Studies at Lake Naivasha, Kenya

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The African Fish Eagle is the quintessential indicator species of the ecological health of aquatic ecosystems in tropical Africa. At Lake Naivasha in Kenya's Great Rift Valley, human caused habitat changes along the lake's shoreline, alien species introductions, deteriorating water quality, over fishing and declining lake levels are some of the factors that have contributed towards population fluctuations of African Fish Eagles. In this paper, we present new information on the current status of African Fish Eagles at Lake Naivasha built over long term studies initiated by Leslie Brown in the late 1960s. Conservation implications and the continued need for long term studies on the species are also discussed.

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Conservation of the Madagascar Fish Eagle *Haliaeetus vociferoides*: Past, Present, and Future

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The Madagascar Fish Eagle was already listed as endangered when The Peregrine Fund focused research and conservation effort on the species in 1990. Since then we have identified most nesting sites, located population strongholds, estimated population size and trend, modeled potential distribution from habitat characteristics and satellite imagery, observed population limiting factors, and studied behavior and genetic consequences. With the knowledge gained from this research, we justified and implemented conservation interventions that protect critical habitat, reduce persecution, and sustain population monitoring to detect change that may warrant adaptation of conservation strategy. We believe this approach is sufficient to ensure the species' survival, barring

introduction of new limiting factors that may cause population decline, but the population is so small that frequent and careful surveillance is important. In the process of this work, we have trained and supported numerous students and technicians, developed local capacity to sustain the effort, and protected habitat and natural resources critical for other endangered and endemic Malagasy species as well as local people. We are currently working to add the most important Madagascar Fish Eagle breeding site into the new Madagascar Protected Areas Network. Consistent, long-term funding remains the most serious limiting resource for the sustained effort that is needed.

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Post-fledging Movements of Golden Eagles in Scotland

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The post-fledging movements of large raptors from resident breeding populations in the years prior to recruitment is one of the least understood aspects of raptor ecology, yet knowledge of this phase is vital to effective conservation planning and to avian life-history strategies. Here, we present the results of an ongoing study in collaboration with the Scottish Raptor Study Groups, which utilises satellite telemetry on a sample of nestlings tagged at a variety of natal sites in Scotland, a country well-known for the diversity of habitats exploited by golden eagles. Our analyses examine a number of potential factors which may affect form and timing in the movements of young eagles, including gender, age, natal site and the availability of areas free from breeding pairs.

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A Conservation Framework for the Golden Eagle in Scotland

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Conservation strategies have three elements: species protection, site protection and, the most challenging component, conservation in the wider environment. Watson and Whitfield (2002) proposed a conservation framework for the golden eagle in Scotland whose main innovation, taking a lead from EU conservation Directives, was to incorporate the concept of favourable condition and its maintenance by implementing conservation policies that are regionally targeted at known constraints in the wider environment. Three criteria were suggested to judge favourable condition: a national abundance target of breeding pairs, national and regional targets for breeding productivity, and regional targets for the extent of suitable habitat which is occupied by breeding pairs. Using data collected largely by Scottish Raptor Study Groups, we refine these criteria, first to take the national abundance target and use it to set regional targets. Distribution targets were implicitly incorporated by this process because abundance targets were set regionally, with regard to the proportion of known territories which should be occupied. This allowed us to dispense with the distribution criterion as originally proposed. Our next refinement was to base regional demographic targets not only on breeding productivity, but also on indirect measures of survival (which are likely to have more influence on population dynamics). Despite apparent overall population stability over the last 20 years, the national golden eagle population failed to meet the abundance target and only three of sixteen regions where eagles have occupied territories since 1982 were considered to be in favourable condition. The key constraint preventing favourable condition being met was persecution, predominantly in some areas managed for grouse shooting. The advantages of a conservation framework over similar approaches, such as species action plans, are highlighted.

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Breeding Success and Habitat Requirements of Hen Harriers (*Circus cyaneus*) in Ireland

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Hen Harriers (*Circus cyaneus)* are vulnerable across much of their range, and the success of their conservation in Britain and Ireland depends on our understanding of their breeding habitat requirements. Traditionally, this species has bred in open, upland habitats in areas that typically remain suitable for Hen Harriers over long periods of time. However, many of the areas in which Hen Harriers in Ireland breed are now dominated by forest plantations. Compared with open habitats like grouse moors, heather bog and rough pasture, young plantations are ephemeral habitats that cease to be suitable for Hen Harriers when the forest canopy closes. We used randomised iterative and mixed models to compare habitat composition within 1 km of Hen Harrier nests with that of the wider upland areas in which they breed. The areas selected by Hen Harriers for breeding were characterised by higher proportions of young first and second rotation forest cover, but did not differ with respect to proportions of closed canopy forest. This is the first evidence for a preference by Hen Harriers for second rotation forest plantations, and suggests that heavily afforested areas may remain suitable for Hen Harriers in the longer term. However, we need to more fully understand the influence of habitat composition on Hen Harriers' hunting behaviour and breeding success in order to ensure that the areas where Hen Harriers breed are managed appropriately. Ongoing elements of this study, including tracking of foraging adults using GPS tags, and assessment of diet and breeding success using nest cameras, are generating the data required to achieve this goal.

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Population Trends of Steppe Eagle (*Aquila nipalensis*) at Eilat, Israel– a Cause for Concern

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Visual migration surveys and long-term ringing stations, especially at established migratory bottlenecks, are a vital tool to evaluate population fluctuations in environmentally sensitive species. Raptors are important bioindicators that help identify environmental catastrophes. Substantial proportions of the global population of Steppe Eagles concentrate at Eilat, during the spring and autumn migrations, but counts from 13 spring migration surveys, between 1977 and 2008, indicate a constant decline in Steppe Eagles. Further, the number of juveniles dropped from 30% in the early 1980s to 9-13% from 1999 to date. The numbers observed at Eilat are well below the range of the fluctuations observed in previous surveys. Yosef & Fornasari (2004) considered the decrease in the total numbers of Steppe Eagles, and the decrease in proportion of sub adults within the population, to be a result of the Chernobyl accident on 26 April 1986. This is further reinforced by the fact that in surveys conducted in the springs of 2005-2008 the number of Steppe Eagles remained at 9,000-10,000 Eagles/season. The worrisome point is that in spring 2007, exactly 20 years since the Chernobyl incident, the number of Eagles dropped to 2,858 Eagles. This is also evident in the number of Eagles observed on the peak days – 6949 Eagles between the years 1977-1986, 1523 between 1987-2006, and only 505 in spring 2007. The estimated life span of the Steppe Eagle is 40 yrs; hence T_{50} should be around 20 years, which is spring 2007 since the Chernobyl incident. Although our findings are for a migratory bottleneck for the Steppe Eagles, and not of the breeding populations on the breeding grounds, we consider it imperative that the global community awaken to the situation as observed at Eilat. If not the world might discover, yet again, that we waited a bit too long and yet another species, or even a whole guild, is on its way to oblivion as a result of human activity and the scientific communities' (cautious) inactivity.

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POSTER PRESENTATIONS

ABSTRACTS

Lesser Kestrel Corridors

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Within the framework governing the various conservation measures for the lesser kestrel (*Falco naumanni*), major actions are to promote long-term sustainability of existing stable colonies. However, it is also essential to consider measures for restoration of populations in those areas where the species has been extinguished, or where only small colonies are found and are in decline.

Under these two broad objectives, GREFA has been conducting a series of actions:

1. Assessment of the capacity of the land.
2. Studies of nest site availability.
3. Surveys of the availability of feeding areas.
4. External supplementation of populations and reintroduction.
5. Generation of dispersal corridors.

Under all these planned actions, the program encompasses a corridor from the southeast to northwest across the Iberian peninsula. The design of these actions is being developed around the N-III and N-VI. In turn, GREFA has developed supplementation and reintroduction programs through building “primillares” in different localities of the Autonomous Community of Madrid and in the Guadalajara region.

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Monitoring a Montagu’s Harrier (*Circus pygargus*) Population in Central Italy

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In Italy, Montagu’s Harrier (*Circus pygargus*) is a migratory and breeding bird whose population trend has been considered stable. From recent reports, however, nesting populations appear to be declining in all breeding areas. We present data from a study conducted from 2003 to 2008 in central Italy. The study area was located on the borderline between Lazio and Tuscany. The landscape is mainly used for mixed agriculture of cereal crops such as wheat and barley, and hay. Harriers and nests were located each year through observation of birds showing territorial, mating or nesting behavior. In our study area, the population breeds in small colonies (2-3 pairs) and the location of the colonies was fixed between years. The total number of Montagu’s Harrier pairs increased from 2003 to 2005 (4 vs 16 pairs) and decreased between 2006 to 2008 (16 vs 11) but not all were breeding pairs. Of 50 nests found, 61% were located in wheat, 28% in hay, 7% in barley, 2% in faba bean and 2% in uncultivated fields. Even though all the nests were safeguarded, the failure of broods was high due to harvesting activities and predation. In this area Montagu’s Harrier population is very vulnerable and strictly dependent on nest protection.

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Diet of White Tailed Sea Eagle *(Haliaeetus albicilla)* in Darwin Reserve (North-West Russia)

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Studies of the white tailed sea eagle diet were based on an analysis of food remains collected from 29 nests in Darwin Reserve, in northwest European Russia, in 2003-2006. Annually, 30-35 pairs of white-tailed sea eagles breed in the Reserve.
The gathering of food remains was done directly from nests, in their immediate vicinity, and on perches. The age of fish-prey was calculated from annual rings on scales and flat bones (cleithra). Then, knowing the fish age, the weight and length of the prey were determined. In whole, 334 food items were identified. In occurrence, the fish diet, 89.2% (10 species), was dominating; birds (18 species) and mammals (1 species) account for 10.2% and 1.5%, respectively. In weight, fish, birds, and mammals are 83.7%, 14.8%, 1.5%, respectively.

Among fishes, the most frequent species was roach (*Rutilus rutilus*) (24.2%), slightly less frequent was bream (*Abramis brama*) (22.4%); pike (*Esox lucius*) and blue bream (*Abramis ballerus*) are 13.5% and 9.9% respectively. Perch (*Perca perca*) (5.1%), european carp (*Carassius carassius*) (4.8%), common ide (*Leuciscus idus*) (4.8%), and white bream (Blicca bjoerkna) (3%) were less preferable species. Pike perch (*Stizostedion lucioperca*) (1.2%) and sabrefish (*Pelecus cultratus*) (0.3%) were rare specimens. In weight distribution, we found bream (29.7%), pike (27.6%), roach (9.8%), European carp (8%), blue bream (3.1%), ide (3%), perch (1.4%), and white bream (1%). The average weight of fish-preys was 927±45.29 g (N=296; Min – 90 g, Max – 4500g). The average length of the fish-preys is 33.1±0,72 cm (N=296; Min – 17 cm, Max – 85 cm).

Among birds, ducks (mallard, wigeon, goldeneye) (26.5%) and capercaillie (24%). were the most frequent in white tailed sea eagle's diet. Crows (jay (*Garrulus glandarius*), jackdaw (*Corvus monedula*), hooded crow (Corvus cornix)) and gulls sp. (*Larus sp.*) (9% each) were rarer. Black grouse (*Lyrurus tetrix*), common sandpiper (*Tringa hypoleucos*), and ducklings obtained 6% each. Willow grouse (*Lagopus lagopus*), grey heron (*Ardea cinerea*), gull nestlings, great spotted woodpecker (*Dendrocopos major*), field fare (*Turdus pilaris*), chaffinch (*Fringilla coelebs*) accounted for 3% each. In weight, grouse, 73%, were dominating; ducks occupied 21% of the total prey weigh; the sum of other species was 6%.

Among mammals, the capture of musk beaver by an eagle is highly reliable (1.5% in total weight). Wild boar, fox, arctic hare were obtained as carrion. About 80% cases of carrion consumption correspond to time interval from February to March. This fact can be explained by unfavorable hunting conditions since, during these months, the water is under ice; thus fishes are not available.

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The Current Status and Conservation of Breeding Swallow-tailed Kites in Arkansas

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Between the 1940s and 1990s, Swallow-tailed Kites (*Elanoides forficatus*) were not reported in Arkansas and this species was assumed to be extirpated from the state. Starting in 1998, several sightings of this species have been documented (April-August) in the vicinity of the White River National Wildlife Refuge (WRNWR). Since 2001, we searched the WRNWR extensively to document the status of this species in Arkansas. On 24 May 2002, we located an occupied Swallow-tailed Kite nest, the first nest documented in Arkansas in over 100 yr. This nest failed shortly after our discovery. We found four additional nests, each in separate years from 2004–2008. All five nesting efforts failed to produce fledglings. This lone Swallow-tailed Kite pair and their nest in Arkansas failed during the incubation stage in 3 years and during the brood-rearing stage in 2 years. As these five nests were located within a remote 3-km-diameter area in different years, we suggest that these breeding attempts involved at least one of the same adults. Significant in 2005 and subsequent years, was that the birds laid eggs approximately 4 wk earlier (mid April) than in previous years (laid in late May). Our observations on both Swallow-tailed and Mississippi kites (*Ictinia mississippiensis*) at the WRNWR suggest that predation was a primary cause of nesting failure in both species with the most common predators being rat snakes (*Elaphe obsoleta*) and Barred Owls (*Strix varia*). As the Swallow-tailed Kite seems to have a high fidelity to breeding sites and tends to nest in loose colonies, some observers have suggested that single pairs of kites are unlikely to colonize vacant habitat. Therefore, this ongoing natural re-colonization in Arkansas is significant as this nesting area is approximately 370 km north of the closest known occupied Swallow-tailed Kite habitat in the U.S.A.

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Recreation of Karla Lake in central Greece. Does it Produce an Optimum Foraging Habitat for Barn Owls?

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The region of Thessaly is located in Central-Eastern Greece, and forms the largest agricultural ecosystem of the country occupying a total of 5.000 km^2. Until 1961 the lake of Karla occupied a total of 13.000 ha in the south-eastern part of Thessaly, forming a very important wetland for the lowlands of central Greece. In 1962 though, Greek Ministry of Environment realized the draining of the lake in order to use its wide extensions for agricultural crops. Until 1970 cultivations were productive, but drainage of the lake had damaged seriously the ecosystem's aquatic equilibrium. After 1970, the damaged water balance along with many other factors led to the collapse of all agricultural schemes in the area of former Karla Lake. Until 1985 all agricultural practices were abandoned, and after 1990 an initiative begun for the recreation of the lake. At the present time, 8,000 ha in former Karla Lake region comprise an unfragmented subtropical steppe with natural grasslands, and several water reservoirs have been constructed in the bordering zone of the area. The Barn owl feeding habits were studied in the region of Thessaly for three consequent years, in a broad landscape and temporal scale. A total of 10,061 pellets were analyzed which produced 29,065 indentified prey items, from a total of 31 sampling breeding sites. A strong shift was present in the owl's diet along both longitudinal and latitudinal gradients. As sampling sites approached the steppes of former Karla Lake the owls demonstrated very low diet diversities due to the capture of vole species. It is possible that the subtropical steppe of former Karla Lake is functioning like a main dispersal tank for voles in Thessaly, since it is their favourable habitat worldwide. Moreover, the domination of voles in Barn owls' diet in breeding sites adjacent to the former Karla Lake, is corroborating the optimum foraging theory. Although lack of live trapping sessions does not allow to test this hypothesis more rigorously, first recordings of the owl's diet and multivariate statistical analysis with the use of Canoco software, indicate that most of Thessaly lowlands provide mainly unfavourable foraging habitats for Barn owls. Thus, the recreation of Karla Lake will be to the benefit of all in Thessaly, but the future of Barn owls in the area could be problematic and should be continuously monitored, evaluated, and some special conservation measures should be taken.

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Monitoring Global Change with the Lesser Kestrel (*Falco naumanni*): Development of an Automatic Remote Monitoring System

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The final aim of project HORUS is to develop and test an automatic monitoring system of the long-term response in population size, reproduction, body condition, and behaviour, of a Lesser Kestrel breeding colony in an agricultural area. We are developing an automatic recording system of the individuals present at the colony, that is located in agricultural cereal silo (La Palma del Condado, Huelva, Spain). We are using use passive integrated transponders (PIT) glued to the PVC rings fitted to the kestrels, "intelligent" nest-boxes equipped with PIT decoders and data-loggers, electronic balances to weight individuals when they enter the nest, and digital video cameras to record kestrel behaviour. All sensors are connected and controlled by a computer system that records information on a database and transmits it remotely. We have been testing different nest-boxes prototypes integrating all electronic sensors. Two "intelligent" nest-boxes have

been placed in the breeding colony and monitored for a complete annual cycle. Nest-boxes are readily accepted by kestrels and we have solved the installation and operational problems. The system registers if an individual gets in/out the nest-box, reads the PIT code if the kestrel is tagged, and records body weight from the balance. All information is stored in a database that can be accessed remotely from internet. The video cameras provide data on behaviour at the nest (incubation times, feeding frequency, prey selection, breeding success) remotely and without interference by the researcher. The system is open to integrate new sensors at the nest-box (e.g. temperature, humidity, etc...), or outside (external video cameras). Video cameras can be activated by movement, by detection of a PIT tag, or periodically depending on specific research project needs. The project will be completed with kestrel tagging with PITs and long-term follow up of individual kestrel histories.

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Do Claw Geometrical Characters Differ in Owls, Raptors, and Non-Raptorial Species?

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A long-held concept is that Falconiformes and Strigiformes possess a strong similarity in their claws due to their adaptive convergence for preying specialisation and that claws differ from those of other bird species, justifying the usual name of talons, instead of claws. We all subjectively feel that talons in birds of prey are all very similar and even somewhat different from claws of other birds, but the analysis of geometrical reason for that has been neglected so far. The aim of this study was to answer two questions: (1) whether talons of raptors and owls are actually similar and (2) which parameter can describe the similarity or difference. The structure of digits and claws of the first- (digit-1) and third digit (digit-3) was evaluated in four groups of birds: Strigiformes, Accipitridae, Falconidae, for the analysis of difference among the birds of prey, and Non-raptorial species, used as out-group. One adult male per species was considered, and, among Non-raptorial birds, only species belonging to typically or partially perching families. Only one specimen per species was chosen, from museum skin collections. Species and families considered were those listed by Sibley and Monroe (1990) worldwide. The Discriminant Function Analysis segregated Strigiformes from Non-raptorials, while Accipitridae had a moderate overlapping area on both. The Falconidae, however, have an almost symmetrical overlap on Accipitridae and Non-raptorials. Function-1 separated Strigiformes from Non-Raptorials and involved constantly digit-3. Function-2 segregated Strigiformes from Accipitridae and from Falconidae and basically involved digit-1. Among the most important characters are the curvature of both claw-1 and 3, as absolute value and in relation to their own length and to their phalanx, and the section shape (thin or rounder) of claw-1 and digit-3's last phalanx. Our results show that although apparently similar, Owls' talons differ in several characters from Accipitrids' ones, while Falcons show intermediate characteristics between Accipitrids and Non-raptorials, showing to be surprisingly less specialised in their talons than Accipitrids.

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Scottish Raptor Monitoring Scheme: Trends in Scottish Raptor Populations 2003-2007, and Future Directions

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The Scottish Raptor Monitoring Scheme comprises seven partner organisations and has three major objectives: (i) to facilitate cooperation between parties; (ii) to provide robust information on Scottish raptor populations by determining trends in numbers, range, survival and productivity and understanding the causes of change; and (iii) to maintain high and uniform standards for the collection, collation, auditing and analysis of data, and reporting of information. Data have been collated from across Scotland for 19 species since 2003:14 diurnal raptors; four owl species; and the Common Raven (*Corvus corax*). Here we provide the results of a scoping study to assess population and productivity trends at a range of spatial scales using the first five years of data from the scheme. We provide trend information for a sample of species, summarise the suitability of the data for providing future trends, and highlight recommendations for developing data collection further.

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Adult Nest Attendance and Prey Delivery by White-tailed Eagles *Haliaeetus albicilla* in Scotland

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Following extinction as a breeding bird in Britain and Ireland by the early twentieth century, White-tailed Eagles *Haliaeetus albicilla* were successfully reintroduced to the west of Scotland from 1975 onwards. A by-product of intensive nest protection surveillance was a collection of detailed nest log data, noting adult behaviour, including changeovers and prey deliveries. In this paper, we present nest watch data gathered between 1985 and 1998 on the island of Mull, describing the allocation of parental duties between adults throughout the incubation and nestling period. Sample sizes were small and observation periods highly variable, so we used Generalised Linear Mixed Models (GLMMs) to investigate seasonal, diurnal and between-sex patterns of behaviour. All parental duties were shared, but shares were not equal between males and females. Females incubated and brooded for longer than males and spent more time feeding small young, while males delivered more prey to the nest at the small chick stage. Nests were not provisioned during incubation, but instead males incubated (and brooded) for significant periods of time, relieving females to forage for themselves away from the nest. Prey delivery rates ranged between pairs from 0.06 to 0.25 items per hour of observation; rates and variation were similar to those reported from Norway and Greenland, and for Bald Eagle *Haliaeetus leucocephalus* in North America. There were no clear seasonal or diurnal patterns. Relatively equal shares of parental duties and provisioning nests only with young represent components of an energy-efficient breeding strategy for a large raptor foraging at similar or lower altitudes than that of the nest, sometimes over long distances: patterns of behaviour appear to differ markedly from those described for Golden Eagle *Aquila chrysaetos*, a similar-sized species breeding sympatrically with White-tailed Eagles in Scotland.

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The connection of European populations of Black Vulture: update of the Catalan Pyrenees reintroduction program (NE Spain)

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The reintroduction project is based in the Catalan Pre-Pyrenees, an approximately symmetrical mountain range on each side of the Pyrenees, surrounded by the rivers Aude, Garona and Ebre. The two release sites are the National Game Reserve of Boumort, with an area of 13,097 ha, and the Alinya Mountain, which occupies 5,350 ha. A viability analysis for the project was produced on 2005 and was approved by the Catalan Government. Its principal targets are to reintroduce the Black Vulture as a breeding species in the Pyrenees (which hadn't bred there since the second half of the XIX century) and to establish a population which could reinforce the link between the Iberian and the French populations, which would in turn increase genetic variability. The techniques used for this reintroduction are habituation enclosures for adult individuals (n=25) and hatching of vulture chicks (n=1). All the individuals were bred in European zoos and marked with rings, patagial wing-tags, radio and GPS telemetric transmitters.
Out of 26 individuals released 2007 - 2009, the results so far are: 14 individuals have stayed in the area (54%), six are found outside this area (23%), four (15%) have been found dead and two (8%) are missing. Also, two pairs have been formed with sexually mature individuals. The only vulture hatched as a chick has returned to the release site after 18 months and is still on the move during dispersal. After two years of the project we conclude that the first target – to reinforce the link between Iberian and French populations – is being achieved: five French vultures from Cevennes have been spotted at Boumort and Alinya, seven Catalan vultures have been seen in France, two Catalan vultures have joined the Extremadura populations in the southwest of Spain, and some other unmarked vultures have been seen in the Pyrenees, probably from the same Extremadura populations.

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Honey-buzzard (*Pernis apivorus*) Telemetry: Post-nuptial Behaviour, Dispersal and Habitat Selection

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Despite its size and due to its secretive, forest-dwelling character, the honey-buzzard (*Pernis apivorus*) is difficult to observe, and post-natal behaviour and habitat requirements have not been well described in the literature. I studied eight honey-buzzards fitted with VHF transmitters from six nests in the National Park Donau-Auen, Austria, from fledging until migration commenced.
Behavioural data were collected from direct observations made mostly from a portable hide. Daily movements were plotted to determine home range size and habitat characteristics within home ranges were compared to those in the surrounding area. Fledging occurred at 41-42 days. Fledglings from broods of one were fed by their parents 8-11 times a day; fledglings from broods of two, 10-15 times. The young were silent most the time, and centred their activity in an area of 1 ha around nest site for first 2 weeks. Mature forest stands were preferred in which fledglings used only the canopy zone. At 16-17 days post fledging young were independent from their parents, which is unusual for raptors of that size. Two days before the onset of migration fledglings shifted their activity centres to areas 1.3-2km away from the nest site; range sizes during this time were 2.4-3.7 hectares. Migration started suddenly when

honey buzzard chicks were 59 - 61 days of age. Siblings had no contact with one another during the days immediately prior to migration. On the first day of migration young honey-buzzards avoided non forested habitat, and did not soar but flew exclusively below canopy. Distances travelled during the first day of migration were 8-11.5 km. This telemetry-based investigation brought deeper insights into the behaviour and ecology of honey buzzards prior to dispersal, a food specialist and extreme k-strategist. To maximize its reproductive success it seems that key factors like food finding, predatory avoidance and migratory traits develop rapidly prior to migration.

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Behavior of Autumn-migrating Sharp-shinned and Cooper's Hawks (*Accipiter striatus, A. cooperii*)

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The Appalachian ridges of Pennsylvania comprise one of the key corridors for migrating raptors within North America. Hawk Mountain, located on the southern-most ridge, the Kittatinny, has been designated a global, continental, and state Important Bird Area because of the concentration of raptors migrating here each autumn. Although counts of migrants have occurred since 1934, few data exist on the behavior of migrating hawks and the extent of resting and feeding en route. Because few raptors build up fat prior to migration (Bildstein 2006), feeding and resting opportunities could be important. As habitat alteration and land use change accelerate throughout the eastern flyway, it is important to understand the behavior of migrants and how habitat changes may challenge them. In autumn 2003 and 2004, 44 Sharp-shinned and Cooper's hawks were radio-tracked for one to 12 days during migration. Behavior was quantified from sunrise to sunset daily. Birds only migrated 37% of days monitored and migration behavior encompassed only 10-15% of their day on average. Some birds showed no migration on 1-4 consecutive days and then migrated for 1-5 consecutive days; others alternated single migration and "rest" days. Both species roosted and foraged an average of 30 to 40% of each day, with more time roosting on non-migration days (>50%). Adult accipiters spent more time migrating than hatch-year birds ($F=3.93$, $p=0.05$). Cooper's hawks spent more time roosting than Sharpshins (mean 42% versus 33%, $F=6.382$, $p=0.004$). We found that autumn-migrating raptors spend considerable time resting and feeding each day during migration. Replenishing reserves before continuing flight appears highly important and the availability of suitable stopover habitat within migration corridors may be critical for the long-term conservation of migratory raptors.

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Unexpected Indifference of Golden Eagles (*Aquila chrysaetos*) to Heli-skiing and Military Helicopters in Northern Utah, U.S.A.

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During 2006-2007 we investigated potential effects of heli-skiing on Golden Eagles in the Wasatch Mountains, Utah, through evaluation of historical records, direct and indirect observations of heli-skiing operations, and controlled experimentation with military helicopters at surrogate nest sites. We observed 303 helicopter passes near ≥30 individual Golden Eagles in 22 breeding areas,

with 227 experimental passes approximating heli-skiing operations in pattern, timing, and duration. Flight paths included flyby's at 800, 400, 200, and 100 m, plus approach's and popout's where the helicopter flew straight towards, or popped out from behind, active cliff nests as it passed directly overhead (0 m). Multiple helicopter exposures resulted in 66% no response and 30% watching, with no effect on nesting success or productivity within the same year, or on renewed nesting the following year. Limited reactions (4%) only occurred after hatching, when ≤6 eagles at 5 sites either flattened on the nest or flew. However, flushes resulted from aircraft precipitating an imminent departure, rather than eliciting an excited, startled, or avoidance reaction. Overlap between nesting Golden Eagles and heli-skiing in the Wasatch Mountains is minimal; however, during 8 years of successful nesting, heli-skiing occurred in the same drainage 10-37 days between 15 Dec and 15 Apr, with 108-2,836 separate helicopter flights. Apache test helicopters were ~2x louder than civilian helicopters used for heli-skiing. Sound decreased with distance, and most abruptly when flights were perpendicular to cliff and ridge lines. Much helicopter sound energy is lower frequency than Golden Eagles can hear, thus reducing expected impacts. We found no relationship between helicopter sound levels and corresponding eagle behaviors, nor did we observe any significant, detrimental, or disruptive responses to helicopters or current heli-skiing operations. This project exemplifies a dual need for circumstance-specific disturbance research, as well as enlightened resource management to accommodate unexpected results.

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PBDE Flame Retardants in Eggs Reduce Reproductive Success of Ospreys in Oregon and Washington, USA

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Polybrominated diphenyl ethers (PBDE) are widely used flame-retardants in thermoplastics, textiles, polyurethane foams and electronic circuitry. Recent research in laboratory animals suggests that PBDEs and their metabolites are embryotoxic, hepatotoxic, neurotoxic and impair the thyroid hormone system. PBDEs were found in all 120 Osprey (*Pandion haliaetus*) eggs collected in Oregon and Washington between 2002 and 2007. Preliminary results indicate that eggs from reservoirs in the forested headwaters of the Willamette River contained the lowest PBDE concentrations (geo. mean, 98 ng/g wet weight [ww]), while those from the upper Willamette River contained the highest (897 ng/g). Concentrations in eggs from the Columbia River progressively increased downstream from Umatilla, OR (River Mile [RM] 286) to Skamakoa, WA (RM 29) which indicated added PBDE sources along the river. In general, these preliminary results suggest that differences in PBDE concentrations reported in Osprey eggs along the three major rivers studied (Columbia, Willamette and Yakima) seem to reflect differences in river flow (dilution effect) and the extent of human population and industry (source inputs) along the rivers. PBDE concentrations increased over time at two locations (Seattle, WA; Columbia River, RM 29-84) where temporal patterns could be evaluated. Only during 2006 and 2007 did ΣPBDE concentrations in Osprey eggs exceed 1000 ng/g ww with negative relationships preliminarily found at both locations (upper Willamette River and lower Columbia River, RM 29-84) between productivity and ΣPBDEs in eggs ($P = 0.008$, $P = 0.057$). Osprey eggs from Everett, WA contained nearly twice the ΣPBDEs (238 vs 141 ng/g ww, $P \leq 0.05$) as Double-crested Cormorant (*Phalacrocorax auritus*) eggs collected at the same location and time. There was no evidence that PBDE congeners (including ΣPBDEs) and eggshell thickness were related.

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Do the Golden Eagle (*Aquila chrysaetos*) and the Mountain Hawk Eagle (*Spizaetus nipalensis*) Adapt Enough to the Habitat of Japan?

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Japan has long main islands in the north and south, strong seasonality and a rich biodiversity. The Golden Eagle (*Aquila chrysaetos*) and the Mountain hawk eagle (*Spizaetus nipalensis*) live in similar habitat in the main islands and their diets partially overlap. From national survey results, 260 pairs of the Golden Eagle are estimated to live in Japan. The north-island population is bigger than in the southern island. Breeding success was calculated at 40% in 1980s, but decreased to 16% in 1990s and 20% in 2000s. 1800 pairs of the Mountain hawk eagle are estimated to live in Japan and the population density in the north is lower than the south. The breeding cycle takes two years and breeding success was calculated at 14.7% in 2000s. We have monitored the breeding success of 6 pairs of Golden eagle and 15 pairs of Mountain hawk eagle in the Suzuka Mountains from 1999 to 2008. We found that 9 golden eagles (1.5individual/pair/10years) and 22-mountain hawk eagles (1.5 individual/pair/10years) fledged, and three pairs of golden eagle disappeared from their territories. Disturbance in the form of change in human use of the mountain forest such as increased large-scale afforestation or decrease in deforestation for local use probably adversely affects the Golden eagle. A loss of large trees for nesting and disturbance by crows are probably the main threats faced by the Mountain hawk eagle. We presume the Golden eagle is finding it difficult to adapt to habitat change because of the increased difficulty in finding prey but the Mountain hawk eagle is probably better able to adapt to habitat change because of a wider range of prey and vegetation types used in Japan.

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Post-nestling Survival and Dispersal of Radio-tagged Little Owls (*Athene noctua*) in Britain

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The recent decline of the Little Owl (*Athene noctua*) in Britain calls for a greater understanding of the processes affecting populations of this species. The loss of suitable habitat and changes in land use practices are thought to be the main reasons for the decline in *A. noctua* across Europe. The level at which these changes have impacted on the British *A. noctua* population is currently unknown. In this study, radio-tagging was used to look at the time of fledging, post-fledging dispersal, juvenile survival and the causes of mortality in seventeen *A. noctua* nestlings from seven nest sites. The nest sites are all either on or in the vicinity of Salisbury Plain (Wiltshire, UK) and are part of the Imber Conservation Group raptor and owl monitoring programme. The nestlings were fitted with radio-tags at three to four weeks old and were radio-tracked daily between June and September 2008. Six juveniles were predated within 15 m of their natal site during the first month. Eight juveniles roosted within 50 m of their natal sites during the first two months and continued to beg for food. The majority of the tagged juveniles took their first flight of independence between two and three months. Nest-site selection was the primary influence on post-nestling survival and dispersal in *A. noctua*.

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Raptor Nests on Power Lines in Andhra Pradesh, India – Species Recorded, Type of Structures Used and Concerns Raised by the State Transmission Utility

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The use of power lines for nesting by raptors has so far not been described in India. Nests were observed during a study of raptor nesting sites around Hyderabad, between March 2002 and March 2007. A number of raptor species were observed nesting on power line structures within a 100 km radius of Hyderabad city. There were instances where the State Transmission Utility (STU) destroyed raptor nests from Extra High Tension (EHT) transmission towers. An awareness program was initiated to sensitise the utility field staff on the nesting issue and utility concerns raised were recorded and evaluated. In Andhra Pradesh and across India, power utilities destroy raptor nests on power lines, without addressing operational concerns and in spite of the fact that such activity is illegal. Damaging eggs or disturbing eggs or nests of raptors is a criminal offense punishable with imprisonment and fine under the Wild Life (Protection) Act, 1972. A total of 25 nests of eight raptor species were recorded nesting on power lines; 88% (n = 22) were on transmission towers. 95.4% (n = 21) of these were on vertically configured designs. On such towers, all nests were situated within the main lattice, between the cross arms. These nests were located in non-critical areas of the towers, and posed no threat to the power supply. Destroying nests will have a negative impact on the populations of the affected raptor species in India. Accommodating nests on power lines and managing operational concerns without destroying nests should be the preferred practice adopted by the electricity utilities in India. This would enhance wild raptor populations.

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Recovery Initiatives in an Endangered Population of the Ferruginous Hawk (*Buteo regalis)*

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The Ferruginous Hawk is a large, open-country specialist whose range occurs primarily in the north and south-central United States, but extends into the Canadian provinces of Alberta, Saskatchewan, and Manitoba. The species is listed as endangered in Alberta, and has been recommended to be listed as nationally threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Monitoring surveys estimate that the population in Alberta has been reduced from 1 702 pairs in 1992 to an estimated 618 pairs in 2005. A government- led, multi-stakeholder recovery team has been created to oversee the recovery of the species within Alberta. Two of the threats identified include (1) loss of nest structures following removal of the few native remnant trees on the prairie landscape; and (2) electrocution on power poles. Limited nest site availability has been countered by the placement of artificial nest platforms over several decades; an evaluation of this strategy as an effective tool for recovery is currently underway. A recent study on raptor electrocution situated just north of the ferruginous hawk range in Alberta highlighted the potential significance of this source of mortality when it estimated that a minimum of 542 raptors may have been electrocuted within a 13 400km^2 study area over the summer months each year. It is suspected that, given the small population of this species in Canada, electrocution mortality could have a disproportionately large adverse impact on the ability of the species to recover. As such, mitigation measures, such as retrofitting hazardous poles within the vicinity of active nests, and encouraging relevant utility companies to develop formal Avian Protection Plans, have been identified in the recovery plan. This recovery team arrangement is an

example of a productive partnership between affected stakeholders and government, one focused on recovering an endangered raptor population.

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Risk Assessment of Environmental Contaminants in White-tailed Sea Eagles (*Haliaeetus albicilla*) from Germany

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During necropsy of free-ranging White-tailed Sea Eagles (WSE) the organs and adipose tissue were collected for analysis of environmental contaminants. Liver and kidneys were analyzed for the nonessential heavy metals cadmium, mercury and lead. Livers and adipose tissue were analyzed for chlorinated pesticides and polychlorinated biphenyls (PCB).
According to national and international legislations we found declining body burden of mercury and chlorinated hydrocarbons. Cadmium levels were harmless for birds of prey.
Extraordinary high levels of lead, indicating acute lead poisoning (> 5 mg/kg wet weight), were detected in 24 % of 277 immature and adult WSE from Germany. Lead poisoning in predatory and scavenging birds, like WSE, results exclusively from alimentary ingestion of lead ammunition. Lead shot and fragments of lead bullets are ingested by preying on shot crippled (and therefore handicapped) waterfowl and game, or feeding on carcasses and gut piles with embedded lead ammunition. No other source for high lead concentrations in body tissue of wild birds has ever been detected other than for lead ammunition or lead fishing weights.
Nearly all lead poisoned WSE were found dead or moribund in the fields from October to March, during and after the main hunting season. Lead levels during spring and summer were generally low and represent background levels for birds of prey.
Most lead poisoned WSE were found in regions known for high game density and hunting activities. These results may suggest that foraging on carcasses and gutpiles of game animals which were contaminated with fragments of lead ammunition or lead shot were the main source for lead poisoning in WSE, which was supported by radiographs and analysis of gizzard contents.
The only possibility to prevent lead poisoning in raptorial birds is a legal ban of lead shot and other lead ammunition for hunting with substitution by non-toxic shot.

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Assessment of Movement Patterns in the Short-eared Owl *(Asio flammeus)*

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The Short-eared Owl is a cosmopolitan species found on every continent except Australia and Antarctica, and is associated with a variety of habitats including grasslands, arctic tundra, marshes, fallow fields and occasionally active agricultural areas. It is generally considered a nomadic species moving in relation to cyclic vole *(Microtus spp.)* populations. According to Breeding Bird Survey data, the species suffered a mean annual decline of 4.6% from 1966 through 2005 across North America, which corresponds to a cumulative loss of about 85%. In Canada, the Short-eared Owl has had Special Concern status since 1994, although the updated 2008 status report by the Committee on the Status of Endangered Wildlife in Canada indicated that it nearly meets the criteria for Threatened. It is unclear what exactly has caused this population

decline; due to its cryptic nature, important aspects of the owl's biology remain poorly understood. One of the main obstacles to assigning the species a higher conservation status and to implementing a management plan is the inability to develop accurate population estimates. Therefore, a better understanding of the local and continental movement patterns of Short-eared Owls is necessary, in part to determine the extent of nomadism versus site fidelity. To this end, possible research approaches include colour marking, radio telemetry, satellite telemetry and stable isotope analysis. One or more of these methods will be used during a pilot field season in spring 2009 to investigate movement patterns within and potentially beyond southern Ontario. We will report preliminary results of this study as well as present the direction for a second field season in winter and/or spring 2010.

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Global Raptor Information Network

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The Global Raptor Information Network ("GRIN") is a web-based project designed to provide information on diurnal raptors and to facilitate communication between raptor researchers and organizations interested in the conservation of these species. GRIN is designed to: (1) Provide an extensive database containing basic biological information on the diurnal raptors of the world, (2) help identify priority species for conservation actions and species in need of further study, (3) provide access to the technical literature for researchers and students in remote locations, (4) establish a global network of raptor researchers and conservationists, and (5) post information on new research findings and raptor conservation issues. The main features of GRIN include a species-level database with distributional and conservation status information on 333 species of raptors for 260 countries or major island groups, a searchable bibliography containing nearly 40,000 citations on diurnal raptors, species accounts with information on distribution, taxonomy, movements, habitat, breeding biology, conservation issues, important references, current research projects, and photo galleries, homepages of over 225 raptor researchers representing 64 countries with links to the species accounts, full abstracts from past raptor meetings, links to over 900 raptor organizations, observatories, raptor-related databases, and important journals, and a bulletin board with notices of upcoming raptor meetings, recent raptor news, and requests for assistance. It should be emphasized that GRIN is a dynamic database, and no portions will ever be "complete." Additional information from both older and current literature sources and bibliographic records is being added daily. The ultimate goal is to spread the responsibility for maintaining the GRIN database and species accounts among raptor specialists throughout the world.

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Impacts of Lead Poisoning on Raptors

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The deleterious effects of poisoning from lead shot in waterbirds are well-known and well-documented. In many countries, this has led to legislative controls on the use of lead shot over wetland areas. More recently, it has become apparent that lead poisoning can also be a significant concern for terrestrial wildlife, including raptors. Lead shot is also not the only ammunition that acts as a source of lead, with bullet fragments also being readily ingested, particularly by necrophagous species. It is clear that lead poisoning from ammunition sources can cause unnecessary mortality in raptors and can have conservation level effects on small, vulnerable populations. There is also an increasing body of evidence showing potential human health concerns associated with the consumption of game meats shot with lead ammunition. Apparently viable alternatives are already available, and, in some cases such as California, USA and

Hokkaido, Japan, authorities have already placed strict legislative restrictions on the use of all lead ammunitions. Further research should be directed towards addressing the few remaining knowledge gaps, placing particular emphasis on the efficacy of alternatives to lead bullets, in order to allay any hunters' concerns and encourage uptake, facilitating a rapid transition away from lead ammunition.

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The Impacts of Two Introduced Small Mammals on the Barn Owl *(Tyto alba)* Population in Ireland

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Throughout its range the Barn owl *(Tyto alba)* is primarily a small mammal specialist. Ireland has a reduced small mammal fauna compared to Great Britain and continental Europe. The Bank vole *Clethrionomys glareous* was first discovered in the south west of Ireland in 1964, it is thought to have been accidentally introduced along with imported machinery in the 1920's. It has since extended its range, and now occupies the south and mid west, and parts of the midlands. Where it occurs the Bank vole is now a significant element of the Barn owls diet. In March 2008 the skeletal remains of the Greater white-toothed shrew *Crocidura russula* were discovered in Barn owl pellets collected from a roost in south Tipperary. The objective of this research is to determine the impacts of both introductions on the Barn owl population. Study sites have been selected within three geographical regions (inside the range of the shrew and vole, inside the range of the vole and outside the range of the vole). Pellet analysis and infra red nest recording equipment is used to determine the species composition in the diet within each of the three regions. Initial dietary analysis indicates that the shrew is the dominant prey item in south Tipperary, constituting 68.5% of the diet. Radio telemetry of adult birds allows comparisons of habitat use and home range ecology with respect to the presence or absence of these small mammals. Breeding ecology (productivity, timing of breeding, and frequency of second broods), breeding densities and activity patterns at selected sites is also used to investigate the potential impacts. The Barn owl is a Red-listed *Bird of Conservation Concern in Ireland,* if the impacts of these introductions are found to be positive, specific conservation measures will be developed to benefit the population.

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Diet Adaptability of Golden Eagle (*Aquila chrysaetos*) in Southern Pyrenees

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The Golden eagle (*Aquila* chrysaetos) is a generalist predator able to feed on a wide range of prey species, depending on their availability. Although it is a relatively common

bird of prey in southern Pyrenees, there are va prerequisite. In addition, a casual sightings recording programme has informed the distribution and frequency of Hen Harriers in Ireland outside the breeding season. Winter distribution of the species is more wide-spread than in summer. Males were more commonly observed in upland/breeding locations, suggesting territory holding over the non-breeding season. This advent in knowledge of the Irish Hen Harrier's ecology is of critical importance to the conservation of this threatened species in Ireland throughout the whole year, as heretofore, conservation policy has ignored this aspect. The winter diet of the Hen Harrier is also being studied, as are the movements of wing-tagged birds, which have been found at roosts hundreds of kilometres from their natal areas. Possible threats to winter roost sites were identified and every site has been found to have associated risks. More than half of Irish winter roosts enjoy no legal protection.

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An Integrated Conservation Project for Tree-nesting Bonelli's Eagles (*Aquila fasciata*)

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In South Portugal, 70 pairs of Bonelli's eagles (66% of the total population) range over a diverse set of habitats, from the rolling hills of the Southwest highlands to the extensive plateaus and isolated elevations farther North and East. Extensive scrub and patchy cork-oak (*Quercus suber*) woodland and forest predominate in the Southwest highlands, with large eucalyptus plantations in some areas. Conversely, plateaus are sparsely covered by native oak parkland to almost steppe-like, with barely a few eucalyptus or evergreen-oak (*Quercus rotundifolia*) groves. Ninety percent of the eagle pairs are tree-nesters, in contrast with the rest of Iberia and most of the Mediterranean range. Nests are on tall eucalyptus (*Eucalyptus globulus* and *E. camaldulensis*), pines (*Pinus pinaster* and *P. radiata*) and cork-oaks. The peculiar character of habitats and nesting habits make logging and heavy disturbance from forestry operations and scrub clearing the main risks to the population health. Therefore, sound conservation action must primarily address the management of forestry and related activities. Scientifically based on the findings of 16 yrs of research carried out on the ecology, demography and genetics of the species mostly in the Southwest highlands, a 4 yr LIFE-Nature project was designed, and subsequently approved by the European Commission (LIFE06 NAT/P/000194). The rationale of the project is to act primarily upon the factors that may have negative impacts on the preservation of high quality trees and breeding habitat, and fecundity and adult mortality, by means of a proactive interaction with the paper pulp industry, landowners, forest and game managers, and hunting estates. Forestry operations and other activities are closely followed, and management agreements established. Conciliation of eagle conservation with powerlines and windfarms, close eagle monitoring by field survey and satellite telemetry, staple prey monitoring, and widescale public awareness are also important issues of the project.

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Recovery of American Peregrine Falcons (*Falco peregrinus anatum*) in Eastern Interior Alaska, U.S.A., 1979-2008

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American Peregrine Falcons (*Falco peregrinus anatum*) nest on cliffs along major rivers and their tributaries in interior Alaska. Their populations were severely reduced because of eggshell thinning associated with use of persistent organochlorine pesticides during the late 1940s through the early 1970s, and the

subspecies was declared Endangered by the U.S. Fish and Wildlife Service in 1970. American Peregrine Falcon populations expanded rapidly following implementation of pesticide control in 1972. During the recovery phase, population size and demographic characteristics were monitored along several rivers known to provide Peregrine Falcon nesting habitat in interior Alaska. In the eastern interior, annual surveys were conducted during 1979-2008 on the upper Yukon, Porcupine, and upper Tanana Rivers. Collectively, the surveyed segments had 120 pairs of falcons in 2008, indicating that these river segments account for a significant fraction of the estimated worldwide population of this subspecies. We compared the rate of population increase, as indicated by trend in number of nesting pairs, between these river segments. Our analyses suggest that American Peregrine Falcon populations showed significant linear increases during 1979-2008 in all three survey areas ($P < 0.001$). Annual rate of increase was similar on the upper Yukon and Porcupine Rivers ($P = 0.15$), and was less than the rate of increase observed on the upper Tanana River ($P < 0.01$). We explore potential explanations for this apparent discrepancy. Our data suggest that Peregrine Falcon habitat along these river segments is becoming saturated, making further significant increases in population size unlikely.

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Recovery, Delisting, Protection, and Monitoring of the Bald Eagle (*Haliaeetus leucocephalus*)

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After 40 yr as an endangered species in the U.S., the bald eagle (*Haliaeetus leucocephalus*) was removed (delisted) from the federal list of endangered and threatened wildlife on 8 August 2007. Fueled by a reduction in threats to the bald eagle, the population in the lower 48 States increased from approximately 487 breeding pairs in 1963 to >10,000 today. The recovery of the bald eagle is due in part to the reduction in levels of persistent organochlorine pesticides (such as DDT) occurring in the environment, habitat protection, and management actions. Current threats include heavy metal contamination, encroachment of nesting habitat by development, and power lines. The protections provided to the bald eagle under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA) continue to remain in place post-delisting. To help provide more clarity on the management of bald eagles after delisting, the U.S. Fish and Wildlife Service (FWS) published a regulatory definition of ‘‘disturb,’’ the final National Bald Eagle Management Guidelines, and a proposed rule for a new permit that would authorize limited take under BGEPA and grandfather existing Endangered Species Act (ESA) authorizations. As with any delisted species in the U.S., the ESA requires ≥5 yr of post-delisting monitoring; such monitoring for the bald eagle began in 2009 on a national scale. Using information from Idaho, other Pacific Northwest states, and recommendations made by the Pacific Flyway Council, this poster reviews bald eagle recovery, the delisting process, current protection under the BGEPA and MBTA, management guidelines, provisions for take, and the FWS post-delisting monitoring plan. Despite successful recovery from the brink of extinction, continued vigilance of bald eagle populations is critical to ensuring America’s national symbol continues to thrive in the absence of ESA protection.

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Embryonic Development of the American Kestrel (*Falco sparverius*)

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Embryonic development has been described in detail for several precocial avian species (e.g., the chicken, turkey, and coturnix quail), but

relatively fewer altricial birds. Among the Falconiformes, a comprehensive and detailed description of embryonic development has not been completed for any species to date. In this study, we described the daily development of a North American raptor, the American kestrel (*Falco sparverius*), during the entire course of incubation. Eggs were collected from captive American kestrels within a day of oviposition, fumigated, and artificially incubated. Eggs were candled daily, and two to five eggs were opened for each of 28 days of incubation. Descriptive and metric records were made for selected external and internal features of developing embryos, and photographs were taken of the extraembryonic structures, intact embryos, and selected details of developing external and internal organs. Landmark features diagnostic of each incubation day were noted, and an approximate developmental stage was assigned for each day of embryo development using criteria established for the chicken embryo by Hamburger and Hamilton (1951). This study provides a detailed normal developmental progression of a common altricial raptorial species that can be used by researchers in ecological and developmental research, captive breeding, and a variety of other studies that require knowledge of the normal development of this or a related altricial species. Selected stages of development are compared between the precocial chicken and altricial kestrel embryo.

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Population Trends and Management Scenarios for the Diverse Raptor Community of Dadia NP, Greece

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With approximately twenty breeding species, Dadia National Park (Greece) is characterized by an extremely large variety of diurnal raptors. Raptors are generally considered as good indicators of biodiversity and ecosystem health, and their coexistence in the managed forest is a highly conservation issue, in particular if several rare and globally endangered species occur together. This is the case in Dadia NP, where a first raptor survey was undertaken in the 1970s, but until 1999 most of the surveys were circumstantial and non-systematic. We implemented a systematic monitoring of the breeding raptor populations during 2001-2005 to evaluate status and trends of the populations. Additionally, using the data of nine raptor species together with 23 environmental variables, we performed an Ecological Niche Factor Analysis (ENFA) to model overall raptor habitat suitability and to develop spatial models of forest management considering raptor habitat protection. The total number of raptor territories in Dadia NP was stable from 2001 until 2005 with an average number of 350 ± 16 territories, fluctuating by no more than 12% of the mean level. The population status has been improved for many species when comparing the recent years with the mid '90s, but remains critical in several cases. Raptor habitat suitability was significantly correlated with diversity of habitat and patch shape. We developed the three management scenarios "conservation of raptor biodiversity", "maximum timber production" and "trade off", the last one considering ecological and socio-economic constraints of conservation management. The spatial models for forest management defined the management zones "free forestry", "temporal restrictions", "temporal and spatial restrictions" and "ecological management". These zones based on raptor biodiversity were further used in an overall biodiversity approach including also other taxa to propose the future zonation for the forest management area of Dadia NP.

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Diversionary Feeding: is it Effective at Reducing Kestrel Predation?

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Common Kestrels (*Falco tinnunculus*) are usually predators of small mammals. However, they can vary their diet to make efficient use of abundant localised resources e.g. colony nesting terns. Since 1986, the RSPB has managed a Little Tern (*Sterna albifrons*) colony in Norfolk, England which is now one of Europe's largest colonies (> 300 pairs). Kestrels breeding within close reach of the colony can be responsible for predating large numbers of chicks although predation rates vary annually. Diversionary feeding (DF) is one possible tool for reducing Kestrel predation: the provision of artificial food to the Kestrels may reduce their predation rates on Little Tern chicks. DF has been used for many years but it is expensive, time consuming, may increase breeding success of the Kestrels and it's effectiveness in increasing tern productivity has never been tested. This poster outlines the results of a within-year experiment where DF was switched on and off three times during the season. Results were mixed. When DF occurred, daily predation rates were significantly lower in the first time-period, significantly higher in the second time-period and there was no significant difference in the third time-period. There was a significant correlation between predation rates and the availability of tern chicks. These inconclusive results coupled with the annual variation in predation rates, prompted a longer-term study. We also present some preliminary results from the first four years of a 6-year experiment where DF is switched on and off in alternate years. The results from these studies will determine, whether the cost and time involved in finding Kestrel nests and supplying DF in a rigorous way is an effective conservation tool for Little Terns and has wider implications where raptors come into conflict with other species of conservation concern.

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The Use of a Portable Digital Video Surveillance System for Monitoring Prey Deliveries at Raptor Nests

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During the last decade video technology has improved rapidly, and wildlife video monitoring has successfully been conducted by using modern VHS time lapse and hard disk recorders. This equipment has disadvantages in terms of high power consumption, but in recent years video surveillance systems for low-tension and minor space usage have been developed. Here I describe the use of a portable video surveillance system for monitoring prey deliveries at Eurasian Kestrel (*Falco tinnunculus*) breeding in nest boxes. A total of 164 d were monitored, distributed on 10 nest boxes and 3867 prey deliveries were registered. The system consists of a mini DVR with a built-in video motion detection (VMD), which detects changes in the image captured by the camera. The VMD sensor triggers the recording immediately, and the sensitivity and the detection area are adjustable, which may prevent unwanted recordings. The recordings are stored to a secure digital card (SD-card). The duration of the activated video recording is adjustable, from 5 to 30 sec. When highest resolution is selected, one SD-card (2 GB) could store about 150 min of video recording (i.e. approximately 1800 events with a 5 sec setting). With a 12-volt DC (80 Ah) power supply one unit could last for about 14 d. Compared to recent video surveillance systems used for monitoring prey deliveries in nesting raptors the mini DVR recorder is light weighted, exhibits low power consumption, and has a reliable built-in motion sensor.

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Habitat Selection and Conservation of Golden Eagle *Aquila chrysaetos* in a Low-density Area in NW of Spain

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We analyse the current and historical situation of the Golden Eagle (*Aquila chrysaetos*) in Galicia (NW Spain), where the species is present with a low population density. During each spring from 1997 to 2008 we monitored the mountainous areas with appropriate breeding habitats. To identify high-priority areas for Golden Eagle conservation, we derived predictive models of habitat suitability multivariate analysis using the package "*adehabitat"* within the statistical environment R. The habitat selection for the breeding population was modelled with the aid of topographic variables, land use, degree of humanization and food resources availability. Records, presence/absence of nests, number of nests, and breeding success in the last 11 years were used as the dependent variables; analyses were performed both considering current and old nesting areas (1960's and 70's). At present, the entire Galician population (seven pairs) is located within an area of about 2500 km^2 in the southeast of the region. The best habitat suitability predictors for breeding were those topographical variables that discriminate rugged reliefs. The models obtained may be of use for the management, monitoring and conservation of the Golden Eagle population in this region. Conservation problems associated with habitat constraints such as food supply, availability of nesting sites, changes in land use, human disturbance and interactions with infrastructures are discussed.

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Level of Organochlorine Compounds in Plasma in Blood of Montagu´s Harriers (*Circus pygargus*) Breeding in Farmland and Natural Vegetation

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The Montagu's harrier (*Circus pygargus*), is a ground-nesting semi-colonial bird of prey typical of agricultural areas. It is also migratory, wintering in either subsaharan Africa (European breeding populations) or the Indian subcontinent (Asian breeding populations). Its association with agricultural areas in the breeding (and sometimes the wintering) grounds make this species particularly vulnerable to toxic compounds associated to agriculture (like pesticides). Additionally, it may be exposed to toxic compounds associated to the level of industrialization, like PCBs, in both breeding and wintering grounds. We analyse the levels of organochlorine compounds in blood of adult and nestling Montagu´s harriers breeding in agricultural and natural vegetation areas in Spain (which winter in western Africa), and compare them with those of adult and nestling birds breeding in natural vegetation in north Kazahkstan (which winter in India). We test whether differences in levels observed are more related to differences in exposure in the breeding (e.g. associated to breeding habitats or the level of industrialisation of breeding areas at large) or the wintering grounds (e.g., level of industrialisation in winter areas). We discuss the results in terms of implications for the conservation of the species at large, and particular populations.

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Re-evaluating the Conservation Status of the Critically Endangered Madagascar Fish Eagle

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The island endemic Madagascar Fish Eagle (*Haliaeetus vociferoides*) is currently cited as one of the rarest bird species in the world. With a known global population of 222 individuals (63 breeding pairs) restricted to the island's western seaboard, this species has been classified as 'Critically Endangered' by the IUCN, based on a perceived notion of a historical and continuing population decline. IUCN currently uses the following numerical thresholds for categorising the conservation status of the Madagascar Fish Eagle: (a) rapid

decline - >80% loss over ten yrs or three generations; (b) small population and declining - <250 mature individuals and a continuing decline of >25% within 3yrs or one generation, and all breeding individuals are in a single sub-population; and (c) very small or restricted population – a population with <50 mature individuals. Recently, the demographic history of the population has been re-examined by two independent methods, to compare the species' historical and contemporary distribution, abundance and genetic diversity. Both studies suggest that the Madagascar Fish Eagle has not suffered a recent or continuing population decline, but rather this population is naturally small and stable with an effective population size of ~24 breeding individuals. Based on these most recent data, a re-evaluation of the species' conservation status indicates that the previously assigned categories of 'rapid decline' and 'small population and declining' are now inapplicable. The only category that does apply is 'very small or restricted population', and under the numerical thresholds of this category (<50 mature individuals = Critically Endangered; <250 mature individuals = Endangered; <1000 mature individuals = Vulnerable), the Madagascar Fish Eagle should be downlisted from Critically Endangered to Endangered. These results will hopefully encourage a review of the recommended conservation action for this species, especially the often-cited view that 'recovery management' (increasing population size and distribution) is warranted.

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How Much Does the Climate Change Threaten Sympatric Golden Eagle *Aquila chrysaetos* and Lesser Spotted Eagle *A. pomarina* Populations in the Lowlands of Northeastern Europe?

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The Golden Eagle (GE) and the Lesser Spotted Eagle (LSE) are two raptor species that coexist in lowland regions of northeastern Europe but occupy different ecological niches. Although both species are forest-dwelling here, GE breeds in marshland while LSE occupies mosaic forest-grassland landscape. In the current study we use 15-year monitoring data from Estonia to analyse how much do weather conditions and how much do other factors, such as food resources, set potential limits to populations of the two eagle species. Productivity of both species fluctuated significantly. These changes were cyclic, synchronous and highly correlated – LSE productivity peak was one year ahead of the peak in the GE. This suggests that the two species with completely different ecological niches are similarly affected, LSE directly and GE indirectly, mainly by rodent abundance. However, also weather conditions affected productivity, most strongly during the prelaying period of each species. As the timing of breeding is different, weather seems to have rather weak effect to the synchronity of productivity fluctuations and its importance remains lower than that of the food conditions. Hence the climate change may have an effect on the two species when weather conditions exceed the certain limit but at present breeding performances of GE and LSE populations are driven mainly by rodent cycles.

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Remote Control Monitoring Techniques to Assess the Impact of Wind Farms on Raptors: a Case Study from Thrace, NE Greece

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In this study, we assess the collision mortality, caused by existent and planned wind farms, of a remnant population of the near-threatened Cinereous Vulture (*Aegypius monachus*). Furthermore, we compare results and usefulness of three methods of data collection: visual monitoring, VHF telemetry and GPS telemetry. A systematic monitoring based on visual observations in large and remote areas is restricted by costs, inaccessibility, weather and human resources. Conventional impact assessments often fail to quantify the real threats, while remote control monitoring techniques (RCMT) are valuable alternative tools. In Thrace, the Greek state has selected 2276 km^2 as wind farm priority area (WPA) and 480 typical turbines (930 MW) are planned. 50% of this area is covered by seven Natura 2000 sites; four of which constitute SPAs and two of them National Parks (NPs). Applying the Band-Model combined with rates for active avoidance of the turbines, we evaluated a severe impact of the wind farm development on the species. Assuming the construction of 480 turbines inside the WPA but outside the NPs and without sensitive siting, the mortality would be 10 to 20 vultures per year. For the best studied wind farm of 71 turbines, established in the foraging area of the vultures, a yearly mortality of 1 to 5 vultures (depending on assumed avoidance rate and applied method of data collection) has to be assumed. The estimated collision rates are far too high for maintaining a population, that is heavily impacted by other factors (mainly unintentional poisoning), and that consists of only 20-25 breeding pairs. The results also revealed that the RCMT have advantages over visual monitoring for delivering more precise and trustable results, in particular at larger scales. Higher sample sizes can be obtained, being crucial for a reliable analysis of space use and flying height of the target species.

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Examination of Sexual Signals in the Plumage of the American Kestrel (*Falco sparverius*)

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The American Kestrel (*Falco sparverius*) is the only kestrel within the New World, and is arguably the most sexually dichromatic member of the group in coloration. The wide geographic range of the American Kestrel, which encompasses all of the Americas and includes 17 designated subspecies, represents a unique system for the study of sexual dichromatism in the life histories of kestrels and other birds of prey. This study examined the presence of variation in unique plumage characteristics of male American Kestrels, looking specifically for potential uses of this variation for either individual recognition or status signaling. Comparisons were made of male plumage patterns and ultraviolet reflectance of tail and body coloration of museum specimens of American Kestrels (*Falco sparverius sparverius)* from across North America. Plumage variation in museum specimens was then compared with plumage patterning observed in caught American Kestrels from breeding and migratory sites in Northern California. Examination of the data collected from museum specimens when compared with patterns of variation among caught birds in the field provided the ability to unite behavioral and morphological data with information of plumage patterning across the entire range of the nominate subspecies. Correlations between plumage characteristics and geography, age, and fitness were examined in an attempt to identify the presence of clines or patterns of coloration and variation for male American Kestrels. Further work with museum collections permitted the inclusion of information from additional subspecies of American Kestrels, allowing for comparisons between birds across the entire New World. The determination of the possible use of signals in the plumage of the American Kestrel will aid in future work which will examine the evolutionary relationships of the American Kestrel to other kestrels, and the evolution of sexually dichromatic plumage in the genus *Falco*.

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Raptor Population Response to Intensive Forest Management

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In the heavily forested central Appalachian Mountains, habitat relationships for raptor abundance and diversity have been poorly documented and responses of raptor populations to intensive habitat modification have rarely been studied. Our study area is an active, industrial forest with a planned schedule of annual uneven-age selection harvests and even-age regeneration harvests. In 2000, 48 sampling stations were established systematically throughout the 3,360 ha study area composed of primarily deciduous forest. Broadcast surveys for diurnal raptors were conducted monthly April to August. Based on analysis of variance and the Waller-Duncan k-ratio multiple comparison procedure, a decline in relative abundance of forest-dwelling raptors ($F=10.7$, $P<0.001$) began to occur in 2002 and has continued as the forest has become more open from logging activity. Species specific declines have occurred for Red-shouldered Hawks (*Buteo lineatus*; $F=5.99$, $P<0.001$) and Broad-winged Hawks (*Buteo platypterus*; $F=4.74$, $P=<0.001$). While the average number of detections for open-country species differed significantly by year ($F=2.82$, $P=0.008$), no obvious increasing or decreasing pattern has occurred. Since the study began in 2000, timber harvesting and road building have decreased forest cover at 40% of the survey points. In 2000, ~7% of the study area had received an even-aged harvest and ~15% was selection harvested. At the end of 2007, ~22% was even-age harvested and ~23% was selection harvested. We will continue monthly surveys and update land cover layers to reflect habitat conditions for each monthly survey through 2009. Landscape structure and fragmentation metrics will be calculated for each survey month and will be related to raptor abundance and diversity. With this study, we hope to identify spatial timber harvesting patterns that minimize negative effects on the raptor community.

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Why Are Almost All Second Chicks of the Golden Eagle (*Aquila chrysaetos*) in Japan Killed by the First Chicks?

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260 pairs of the Golden Eagle (*Aquila chrysaetos*) are estimated to live in Japan. Japan is located in one of the southern most parts of its distribution and its habitat is more or less completely covered by dense forest. Although two eggs are laid, the second hatched chick is killed at the high rate of 99% due to severe sibiling aggression which occurs soon after hatching. We have monitored the breeding success of 6 pairs in the Suzuka Mountains from 1981 to 2008 and intensive observation of sibling aggression in 3 breeding pairs was conducted from 1983 to 1985. The breeding success was calculated at 17.4% and no second chicks have fledged for 28 years. All second chicks died within 7 days of hatching due to continuous attacks from the first chicks, in combination with starvation. Attacks from the first chick occurred even if uneaten food was available in the nest. The female parent would never intervene in one-way attacks by the first chicks. Main prey throughout the year consisted of Japanese hare (*Lepus brachyurus*), Cooper pheasant □*Syrmaticus soemmerringi*□, and large snakes such as Japanese ratsnake (*Elaphe climacophora*). Snakes appear when leaves of trees cover the mountains at the end of April, and became very important prey of nestlings because at that time Golden Eagles cannot find and hunt wild animals inside the forests. If both chicks would survive when potential prey for hunting is limited, sibling aggression among grown chicks which results in the death of one or both chicks might be caused by the shortage of food. We presume the extreme high death ratio of the second chick might be the result of evolutionary selection in that siblicide at the earlier stage of nestling brings about a higher survival rate for one chick.

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For more information contact Judy Scherpelz at judy@rmrp.org. Watch for additional information about the conference on the Rocky Mountain Raptor Program website http://www.rmrp.org and the Raptor Research Foundation website http://raptorresearchfoundation.org.

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