

I WORLDWIDE RAPTOR CONFERENCE

A joint meeting with between

Raptor Research Foundation Annual Conference 2013

III Neotropical Raptor Network Conference

WWGBP VII International Conference on Birds of Prey and Owls



Bariloche, Rio Negro, Argentina, October 21-24 2013





I Worldwide Raptor Conference, October 2013, Bariloche, Argentina



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CONFERENCE HOSTS

HOST ORGANIZATION

Centro Regional Universitario Bariloche (CRUB) - Universidad Nacional del Comahue

SOCIETIES MEETING JOINTLY

Raptor Research Foundation, Neotropical Raptor Network (sponsored by The Peregrine Fund), World Working Group on Birds Of Prey and Owls

LOCAL ORGANIZING COMMITTEE

Committee Co-chairs: Valeria Ojeda -Department of Ecology, Universidad Nacional del Comahue and Conicet, Bariloche, Rio Negro, Argentina and **Sergio A. Lambertucci** -Laboratorio Ecotono, Universidad Nacional Del Comahue – Inibiotoma/Conicet, Bariloche, Rio Negro, Argentina, **Miguel D. Saggese** - College of Veterinary Medicine-Western University Of Health Sciences, California, USA.

Local Committee Members and Volunteers: Ana Trejo, Lorenzo Sympson, Gonzalo Ignazi, Facundo Barbar, Agustina Di Virgilio, Ines Croce, Pablo Alarcón, Fernando Ballejo, Nicolás Lois, Gala Ortiz, Karina Speziale, Agustin I. Quaglia, Maite Amoros. Art used in this program and in the Tote bags are courtesy of **Fernando Ballejo**. Banners design courtesy of **Gonzalo Ignazi**.

JOINT ORGANIZING COMMITTEE

Kate Davis (Chair), **Dr. Dan Varland** and **Libby Mojica** - RRF Conference Committee

Dr. Marta Curti and **Dr. Rick Watson** - Neotropical Raptor Network/The Peregrine Fund Representatives

Dr. Bernd Meyburg - World Working Group on Birds of Prey and Owls Representative

ONLINE REGISTRATION MANAGEMENT AND CONFERENCE WEBSITE

Libby Mojica - Raptor Research Foundation and **Miguel D. Saggese** – Raptor Research Foundation and Western University of Health Sciences

SCIENTIFIC COMMITTEE

Dr. James Dwyer – EDM International, Inc and **Dr. Ana Trejo** – Department of Zoology -Universidad Nacional del Comahue (Chairs), **Brian Smith, Miguel D. Saggese** (abstract review)



Welcome to the I Worldwide Raptor Conference in Bariloche!

For the first time, a joint meeting between the **Raptor Research Foundation**, the **Neotropical Raptor Network** (sponsored by **The Peregrine Fund**) and the **World Working Group on Birds of Prey and Owls** is taking place in South America. A perfect mixture of wild nature and cultural heritage awaits you; we will ensure that you experience all the wonders that the city of San Carlos de Bariloche, Patagonia and Argentina have to offer.

This international conference is 21-24 October, 2013, in Bariloche City, Rio Negro Province, Argentina, close to the heart of Nahuel Huapi National Park. The conference host is the **Universidad Nacional del Comahue**, Bariloche, Argentina.

The local organizing committee co-chairs, **Miguel D. Saggese**, (College of Veterinary Medicine-Western University of Health Sciences, California, USA), **Valeria Ojeda** (Department of Ecology, Universidad Nacional del Comahue and CONICET, Bariloche, Rio Negro, Argentina) and **Sergio A. Lambertucci** (Laboratorio Ecotono, Universidad Nacional Del Comahue – Inibioma/Conicet, Bariloche, Rio Negro, Argentina) welcome you to Bariloche, Patagonia, Argentina. We sincerely hope that you have the best possible experience. Together with representatives of the participating host organizations and volunteers, we have done everything possible to make this conference something to remember.

Before, during and after the conference we stand ready to help you have the time of your life in South America. For help with questions, problem solving or if you just simply want to talk raptors, look for us: the local co-chairs; we will be wearing white ribbons each day of the conference. Please don't hesitate to contact us. We are here for you!

In closing, we say thank you very much for your kind support through your participation in this unique event, and welcome to Bariloche!

Drs. **Valeria Ojeda**, **Miguel D. Saggese** and **Sergio Lambertucci**

I Worldwide Raptor Conference Co-chairs





Centro Regional Universitario Bariloche, Universidad Nacional del Comahue



With a program that began in 1978, Biology is one of the oldest and most prestigious programs at Bariloche's Centro Regional Universitario Bariloche of the Universidad Nacional del Comahue (CRUB-UNCo). With a large number of full-time students, CRUB-UNCo is not a big university. One of the university's greatest strengths in fact is the personal relationships among teachers, students and other faculty-members fostered by its small size. CRUB-UNCo offers a B.S. degree in Biology (main orientation is on Natural Resources Management) and also a Ph.D. degree. The Ph.D. is based on a unique type of

free schedule where candidates design their program requirements. High standards are maintained in the program; they may be validated by the quality of the courses taken by the candidates, quality of student annual advance reports and oral presentations, and the requirement that at least one scientific paper from dissertation research be published in peer-reviewed journals (listed in ISI) before submitting the dissertation. These unique requirements make this Ph.D. degree one of the most highly ranked in Argentina. Argentina has a free education system, from entry to the highest levels; both undergraduate and Ph.D. degrees are offered at no cost to the student.

The faculty in Biology is actively involved in research and teaching as well as in community service; faculty members receive some of their financial support from agencies and grants. There are several laboratories and departments developing basic and applied research in different biological fields whose members receive some of their support from outside Argentina (mostly applied to specific research topics), but most of the research, and all the teaching activities, are conducted through wages and subsidies provided by the university and by the Argentine scientific research agencies: the Agencia Nacional de Promoción Científica y Técnica (ANPCyT) and the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET). Two members of the organizing committee, S. Lambertucci and V. Ojeda, are researchers at the CONICET; their offices are located at the university by affiliation there. Scientific Program co-chair Ana Trejo is a full-time teacher/researcher at CRUB-UNCo. Also, the volunteers working with the local committee are mostly composed of students, undergraduates and Ph.D. candidates, from CRUB-UNCo. Research projects on raptors include studies on the ecology and conservation of most species that live in this area.



Raptor Research Foundation, Inc.

The Raptor Research Foundation (RRF) is the world's largest professional society for raptor researchers and conservationists. Founded in 1966 as a non-profit organisation, our primary goal is the accumulation and dissemination of scientific information about raptors. We also promote an awareness and appreciation of



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raptors amongst the general public. Our 950+ membership spans 50 countries on six continents, forming a global network of raptor experts. The world's leading raptor researchers are members of RRF, along with other professional scientists, wildlife managers, educators, conservationists, students and amateur raptor enthusiasts.

RRF achieves its mission in the following ways: organizes annual scientific conferences, provides competitive grants & awards for student researchers & conservationists, provides support & networking opportunities for students & early career raptor researchers, provides grants & awards of recognition for established researchers & conservationists, produces a quarterly scientific journal (*The Journal of Raptor Research*) and biannual newsletter (*Wingspan*) with raptor news from around the world and provides expert scientific advice on international raptor conservation issues to governments, wildlife agencies, zoos, and non-profit organizations.



**Neotropical
Raptor
Network**

Neotropical Raptor Network

The Peregrine Fund

The Peregrine Fund convened the first Neotropical Raptor Conference in Panama in 2002. The Neotropical Raptor Network (NRN)

was launched to bring together the community of people working with raptors in the region, to enhance this community's capacity and effectiveness, and to provide for periodic conferences on Neotropical Raptors. The NRN is a membership-based organization. Its goal is to aid in the research and conservation of raptors by promoting communication and collaboration among biologists, ornithologists, raptor enthusiasts, and other conservationists working in the region. The NRN, sponsored by The Peregrine Fund, aids its members with a list serve, by hosting conferences, by publishing an e-newsletter, and by posting a list of research and conservation priorities for Neotropical raptors.



World Working Group on Birds of Prey and Owls

Active for several decades, the WWGBP plays an important role in the promotion of raptor conservation and research on an international level. Its membership includes more than 3,000 raptor specialists and enthusiasts from around the world. WWGBP serves its members by encouraging the scientific exchange of information on raptors using list serves, publications, and worldwide conferences.

All those interested in raptors are encouraged to become a member free of charge by subscribing to one of the list servers.



Welcome letter from Dr. Ruth Tingay, President - Raptor Research Foundation



Hola, meeting participants!

On behalf of the **Raptor Research Foundation**, it gives me enormous pleasure to welcome you to Bariloche, Argentina, for our first ever joint meeting with the Neotropical Raptor Network and the World Working Group on Birds of Prey and Owls.

Raptor Researchers have travelled from over 25 countries on five continents to be here. Whether you've travelled from nearby or from afar, I'm delighted you could make it for this very special gathering.

With such a multi-national assemblage, we are guaranteed an exciting week with an exceptional opportunity to meet, learn from, share with and be inspired by, raptor research colleagues from around the world. We have a packed schedule, including four outstanding plenary speakers, two special talks, four workshops and over 150 scientific presentations, not to mention various cultural events and an exciting selection of fieldtrips. Make the most of it, because although the conference will be over in a flash, its legacy of new partnerships and collaborations could lead to extraordinary things.

I'd like to pay special tribute to a number of outstanding individuals who have pulled this conference together. Representatives from our host organization, the Universidad Nacional del Comahue, have worked tirelessly with representatives from the Raptor Research Foundation, the Neotropical Raptor Network, The Peregrine Fund and World Working Group on Birds of Prey and Owls to make this event happen. And it's been no easy task, I can assure you! They have volunteered their time and energy over several years (yes, years), all for our benefit, and we all owe them a huge debt of gratitude. Please take the time during the week to thank them for their efforts and commitment: Miguel D. Saggese, Valeria Ojeda, Sergio Lambertucci, James Dwyer, Ana Trejo, Marta Curti, Libby Mojica, Travis Booms, Kate Davis, Dan Varland, Rick Watson and a larger number of volunteers and collaborators.

Thanks also to you, the conference delegates, and especially those of you presenting your work this week. Special thanks to those of you who are having to present in your second, or even third language, and those of you presenting for the first time. That takes courage so please be reassured that this audience is right behind you and really wants to hear what you have to say.

Again, on behalf of the Raptor Research Foundation, welcome to Bariloche, thank you for coming and I hope you all have a fantastic week. Enjoy!

Ruth Tingay

President

Raptor Research Foundation



Welcome letter from Neotropical Raptor Network Advisory Committee

Dear Delegates,

Welcome to Bariloche and the joint conference of the Raptor Research Foundation, Neotropical Raptor Network, and World Working Group on Birds of Prey and Owls.



The Neotropical Raptor Network (NRN) is a membership-based organization created to enhance research and conservation of Neotropical raptors by promoting communication and collaboration among biologists, ornithologists, raptor enthusiasts, and other conservationists working in the Neotropics. Current membership is over 380, and with current sponsorship of The Peregrine Fund, membership is free! To learn more and join the NRN please visit our booth and sign up!

The main features of the NRN are an internet-based discussion forum, a biennial e-Newsletter "*Spizaetus*," an international conference held every four years, a conference proceedings, and the NRN web-site. The web-site is written in both Spanish and English and serves as the home of the NRN (www.neotropicalraptors.org). The e-Newsletter includes popular articles from members and updates on NRN activities; past issues are archived on the website. The moderated discussion forum provides a venue for sharing information and issues of concern related to raptor conservation in the Neotropics. This meeting in Bariloche is the third NRN Conference, and like the Second Conference, we hope to publish the proceedings with help from Keith Bildstein of Hawk Mountain Sanctuary.

The NRN is guided by an Advisory Board of up to ten volunteers mainly from Central and South America. We are looking for new members! We are also taking proposals now for the next conference in 2017. Drop by the NRN booth or talk to either Marta Curti or Rick Watson if you are interested in joining the Advisory Board or organizing a conference in your home country.

Organizing this conference took time and dedication of many people. Please join us in thanking the Conference Organizing Committee Miguel Saggese, Valeria Ojeda, Sergio Lambertucci, James Dwyer, Ana Trejo, Marta Curti, Libby Mojica, Travis Booms, Kate Davis, Dan Varland, Rick Watson, and Bernd Meyburg.

On behalf of the Neotropical Raptor Network we hope you enjoy this conference and the opportunity it provides to share an exciting range of raptor research and conservation efforts.

With warm regards,

Advisory Board of the Neotropical Raptor Network (Marc Bechard, Keith Bildstein, Cameron Ellis, Jaime Jiménez, César Márquez, Ruth Muñiz, Adrián Reuter, César Sánchez, Sergio Seipke, Rick Watson)



Greetings from Kate David, Raptor Research Foundation Conference Committee Chair

This remarkable gathering of like-minded raptor enthusiasts started as an ambitious idea years ago by Miguel Saggese: Latin America hosting its first ever Worldwide Raptor Conference, gathering experts from around the world. Miguel's perseverance, optimism and hard work is now realized, largely due to his devotion and the devotion of localco- hosts Valeria Ojeda and Sergio Lambertucci. I want to give a huge thanks to Libby Mojica for taking charge of the web site and for keeping track of details galore. We are thrilled to have the partnership of the Neotropical Raptor Network; NRN has helped much in conference planning and in bringing good science to the conference through member participation in poster and oral presentations. We know that this may be the first of much such collaboration of the best and brightest aficionados in the world of birds of prey. May they continue long into the future.



Kate Davis, Raptor Research Foundation Conference Chair



Kate Davis photo ©



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Marta Curti

World Working Group on Birds of Prey and Owls

Prof. Dr. Bernd-U. Meyburg

Chairman, World Working Group on Birds of Prey and Owls (WWGBP)

I Worldwide Raptor Conference Co-chairs



I Worldwide Raptor Conference, October 2013, Bariloche, Argentina



Miguel D. Saggese DVM, M.S., Ph.D.

College of Veterinary Medicine, Western University of Health Sciences, Pomona, California, USA

Valeria Ojeda Ph.D

Departamento de Biología, Universidad Nacional del Comahue and CONICET, Bariloche, Rio Negro, Argentina

Sergio Lambertucci Ph.D

Laboratorio Ecotono, Universidad Nacional del Comahue – INIBIOMA/CONICET, Bariloche, Rio Negro, Argentina





We sincerely thank our sponsors for their support to this conference!

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*Preservation through cultural understanding of the Eagle in History,
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Sia is the Comanche Nation Eagle and Raptor program, named for the Numunuh (Comanche) word meaning “feather”. The essence of the Eagle in traditional life is the basis for Sia’s commitment to the culturally based, spiritual needs of indigenous people. Reconnecting cultures with the living bird in ways supportive of the species’ conservation is a primary goal of Sia’s ongoing efforts. Eagles of the world, representing five continents reside at Sia. Sia cares for the live eagles as well as the indigenous culture of shared homelands.

The spectrum of Sia’s diverse preservation efforts ranges from scientific research to the housing of historical items. Artificial insemination and feather micro-chipping are just two of the cutting-edge technologies employed at Sia. Sia houses over 24,000 pages of unpublished historic journals, diaries and letters, as well as over 1,400 historic images pertaining to Numunuh (Comanche) history. Sia archives are the foundation for much of the ongoing ethnological research conducted by Sia staff and associates.

Visit and contact Sia Ethno-ornithological Initiative at

www.comancheeagle.org



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With our research and conservation background we can advise and supply the optimal equipment from these technologies. **Come and talk to Sean Walls** at our exhibition stand for more information on the latest products and how they could answer your research questions. Sean has been advising raptor researchers for nearly 20 years, worked with Common Buzzards for 15 years and co-authored the Spatial Tracking chapter in the book *Raptor Research and Management Techniques*.

Please, visit us at www.lotek.com or contact us at biotelemetry@lotek.com +1 (905) 836 6680 (North & South America), info@biotrack.com +44 (1929) 552 992 (Europe and Asia) or Sirtrack@sirtrack.com +64 (6) 877 7736 (Australasia)





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ECOTONE



Ecotone was founded in 1993 by a group of professional ecologists and ornithologists from University of Gdańsk, Poland. The company first started to produce mist nets to fulfil own needs and supply the local market. The idea of how the nets should be made is a result of over 30 years of experience in catching birds and bats. Since that time our nets have been tested by thousands of customers all over the world and with their help we keep on developing them. Besides mist nets we offer a wide range of equipment for ornithological and bat researches such as spring and electronic scales, colour rings, nets poles, bat detectors and many others.

A few years ago we turned into high technology, starting to produce GPS-GSM loggers for wildlife tracking. Nowadays our telemetry equipment is used worldwide and let researchers to obtain the unique and precise data about animal behaviour and migrations. Our loggers are custom designed for each single project to meet the researchers needs. Now, after 20 years, Ecotone has representatives in South Africa, Brazil, Colombia, United States, Israel, and many other countries of the world.

Please, visit us at www.en.ecotone.com.pl or contact us at





IMPORTANT INFORMATION FOR DELEGATES

- For international calls, taxis, questions about Bariloche, and local services please contact the hotel staff in the front lobby of the Hotel Panamericano.
- The Registration and Information Desk, located in the Hotel Panamericano, will be open:
 - Sunday 20: 17:00 - 20:00
 - Monday 21: 8:00 - 17:30
 - Tuesday 22: 8:00 - 17:30
 - Wednesday 23: 8:00 - 17:30
 - Thursday 24: 8:00 - Noon
- Conference rooms are adjacent, allowing delegates to move easily among sessions.
- Please, contact the Co-chairs (identified with a White Ribbon) or Conference Volunteers (identified with a Blue Ribbon) for all conference-related questions.
- Internet service will be freely available for conference delegates staying overnight at the Hotel Panamericano. For those not staying at the hotel, there is a fee for internet service. Free internet (WiFi) and internet kiosks are available at many locations near the Hotel Panamericano.
- Meals during the conference: Hotel Panamericano counts with restaurants and bars. There are many restaurants available within walking distance from the hotel.
- Sponsors: we encourage you to visit our sponsors' displays.
- Each day opens with a plenary lecture, beginning at 9:00 (9:30 on Monday 21st).
 - Please upload your PowerPoint file the day before your presentation. The personnel from the company hired for the audiovisual services (Full-Tech) will be available all day. Presentations scheduled for Monday morning should be uploaded on Sunday with our volunteers in the Registration Desk (17:00 - 20:00).
- Posters holders will be available Tuesday, October 22. Posters scheduled for Tuesday should be placed by 17:15 on the 22nd and taken down by Noon on Wednesday the 23rd. Posters scheduled on Wednesday should be placed by 17:15 that day. They should be taken down by Noon on Thursday the 24th.

Liability

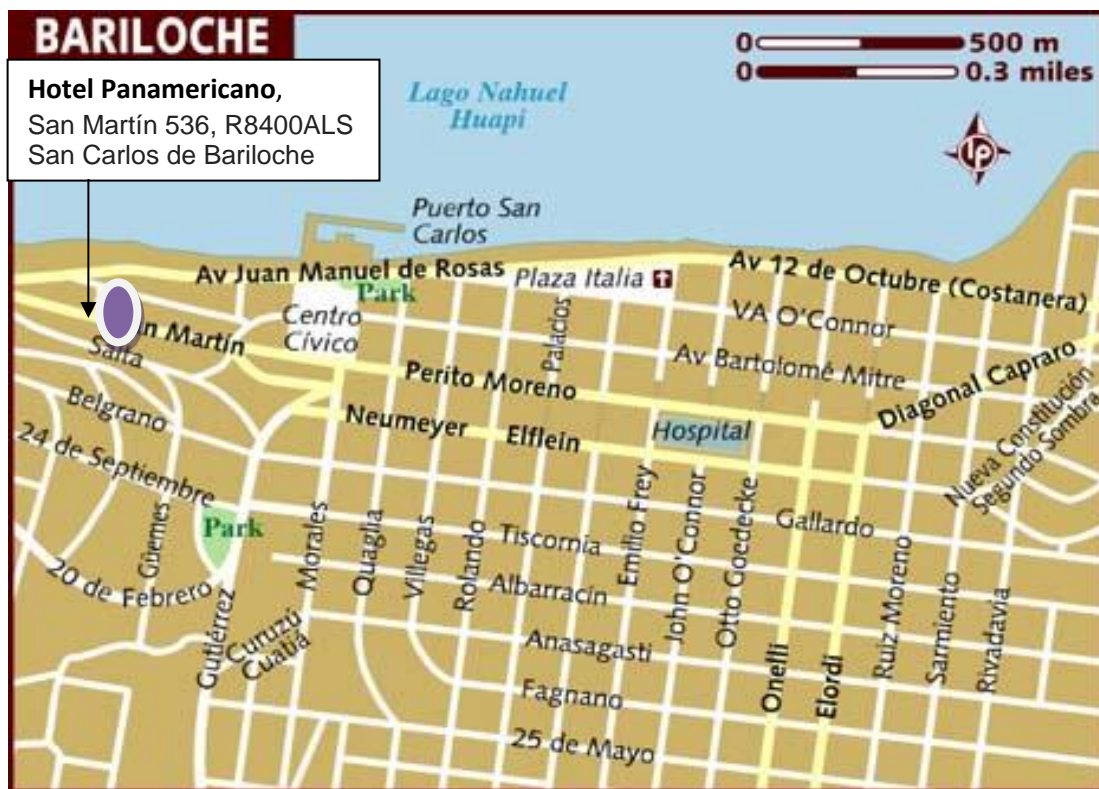
The Conference Organizers, including the conference co-chairs, volunteers, and sponsors, do not accept responsibility for personal accidents, medical emergencies, or damage or loss of personal property incurred by conference participants and their guests.



GETTING AROUND BARILOCHE



Map of Bariloche and surrounding areas



Map of Downtown Bariloche and Hotel Panamericano location



CONFERENCE SCHEDULE AT GLANCE

Friday 18th, Saturday 19th, and Sunday 20th

-Field Trips-Depart from Hotel Panamericano Entrance

Sunday 20th October

-Workshops (Universidad Nacional del Comahue): 10:00 - 15:00

-Registration Desk Opens 17:00 - 20:00

-RRF Board meeting 8:30 - 17:00

-Sponsors set up

Monday 21st

-Registration 8:00 - 17:00

-Welcome 9:00 -9:30

-Plenary Speaker 9:30 - 10:30

-Coffe Break 10:30 - 11:00

-General Sessions 11:00 - 12:30

-Lunch 12:30 - 14:30

-General Sessions 14:30 - 15:30

-Coffe Break 15:30 - 16:00

-General Sessions 16:00 - 17: 00

-NRN Bussiness Meeting 16:30 - 17:00

-Icebreaker Social and Tango Show 18:00 - 21:00

Tuesday 22nd

-Birdwatching around the Nahuel Huapi Lake coast 7:30-8:30 (Be ready at 7:15 in the Hotel entrance)

-Registration 8:30 - 17:00

-Plenary Speaker 9:00 - 10:00

-Coffe Break 10:00 - 10:30

-General Sessions 10:30 - 12: 30



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- Lunch 12:30 - 14:30
- General Sessions 14:30 - 15:30
- Special Talk: Publishing in JRR 14:30 – 15:00
- Andersen Presentations 15:15 – 15:45
- Coffe Break 15:45 - 16:15
- Andersen Presentations 16:15 – 17:00
- Special Talk: Local Committee - Patagonian Raptors 16:15 - 17: 00
- Poster Session and Reception: 17:15 - 18:30

Wednesday 23rd

- Registration 8:30 - 17:00
- Plenary Speaker: John Elliot - Ecotoxicology 9:00 - 10:00
- Coffe Break 10:00 - 10:30
- General Sessions 10:30 - 12: 30
- Lunch 12:30 - 14:30
- General Sessions 14:30 - 15:30
- Coffe break 15:45 - 16:15
- General sessions 16:15 - 17: 00
- Small group discussions 16:15 – 17:00
- Poster Session and Reception: 17:15 - 18:30
- Dinner and Social Event at La Pinta 19:15 - 21:30 (extra fee applies)

Thursday 24th

- Registration 8:30 - 12:00
- Plenary Speaker 9:00 - 10:00
- Coffe Break 10:00 - 10:30
- General Sessions 10:30 - 12: 30
- Lunch 12:30 - 14:30



-General Sessions 14:30 - 15:00

-RRF Meeting 15:30 - 16:30

-Banquet, Awards, Folk show and Dancing Party 20:30 - 2:00 AM

SCIENTIFIC PROGRAM AT GLANCE

	Monday, 21 October	Monday, 21 October
Time	Las Américas	Los Jardines
08:00	Registration opens	
09:00-09:30	Welcome, announcements, etc.	--
09:30-10:30	Plenary: Keith Bildstein – Migration	--
10:30-11:00	Coffee Break	
11:00	Neotropic Raptors	Habitat Relationships
11:15	Neotropic Raptors	Habitat Relationships
11:30	Neotropic Raptors	Habitat Relationships
11:45	Neotropic Raptors	Habitat Relationships
12:00	Neotropic Raptors	Habitat Relationships
12:15	Neotropic Raptors	Habitat Relationships
12:30-14:30	Lunch	
14:30	Neotropic Raptors	Falcons of the World
14:45	Neotropic Raptors	Falcons of the World
15:00	Neotropic Raptors	Falcons of the World
15:15	Neotropic Raptors	Falcons of the World
15:30-16:00	Coffee Break	
16:00	Neotropic Raptors	Falcons of the World
16:15	Neotropic Raptors	Falcons of the World
16:30	NRN Business meeting	Falcons of the World
16:45	NRN Business meeting	Falcons of the World
18:00-21:00	Icebreaker/Tango Music and Dancing	

	Tuesday, 22 October	Tuesday, 22 October
Time	Las Américas	Los Jardines
08:30	Registration opens	
09:00-10:00	Plenary: Pertti Saurola – Owls	--
10:00-10:30	Coffee Break	
10:30	Migration and Dispersal	Nocturnal Birds of Prey
10:45	Migration and Dispersal	Nocturnal Birds of Prey
11:00	Migration and Dispersal	Nocturnal Birds of Prey
11:15	Migration and Dispersal	Nocturnal Birds of Prey
11:30	Migration and Dispersal	Nocturnal Birds of Prey
11:45	Migration and Dispersal	Nocturnal Birds of Prey
12:00	Migration and Dispersal	Nocturnal Birds of Prey



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12:15	Migration and Dispersal	Nocturnal Birds of Prey
12:30-14:30	Lunch	
14:30	Special Talk: Cheryl Dykstra - Publishing	Palearctic Raptors
14:45	Special Talk: Cheryl Dykstra - Publishing	Palearctic Raptors
15:00	Special Talk: Cheryl Dykstra - Publishing	Palearctic Raptors
15:15	Andersen Presentations	Palearctic Raptors
15:30	Andersen Presentations	Palearctic Raptors
15:45-16:15	Coffee Break	
16:15	Andersen Presentations	Special Talk: Patagonian Raptors
16:30	Andersen Presentations	Special Talk: Patagonian Raptors
16:45	Andersen Presentations	Special Talk: Patagonian Raptors
17:00-17:15	Poster setup	--
17:15-18:30	Poster Session	--

	Wednesday, 23 October	Wednesday, 23 October
Time	Las Américas	Los Jardines
08:30	Registration Opens	
09:00-10:00	Plenary: John Elliot – Ecotoxicology	--
10:00-10:30	Coffee Break	
10:30	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
10:45	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
11:00	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
11:15	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
11:30	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
11:45	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
12:00	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
12:15	Infectious Disease & Pollutants Symposium for Biomedicine	Vultures and Condors of the World
12:30-14:30	Lunch	
14:30	Infectious Disease & Pollutants Symposium for Biomedicine	Special Talk: Rick Harness: Electrocution
14:45	Infectious Disease & Pollutants Symposium for Biomedicine	Special Talk: Rick Harness: Electrocution
15:00	Infectious Disease & Pollutants Symposium for Biomedicine	Interactions with Energy Infrastructure
15:15	Infectious Disease & Pollutants Symposium for Biomedicine	Interactions with Energy Infrastructure
15:30	Infectious Disease & Pollutants Symposium for Biomedicine	Interactions with Energy Infrastructure
15:45-16:15	Coffee Break	
16:15	Small group discussions	Interactions with Energy Infrastructure
16:30	Small group discussions	Interactions with Energy Infrastructure
16:45	Small group discussions	Interactions with Energy Infrastructure



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17:00-17:15	Poster setup	--
17:15-18:30	Poster Session	--
19:00	Wednesday Night Dinner at La Pinta Choperia	

	Thursday, 24 October	Thursday, 24 October
Time	Las Américas	Los Jardines
08:00	Registration opens-	
09:00-10:00	Plenary: F. Hiraldo- Long-term Research	--
10:00-10:30	Coffee Break	Coffee Break
10:30	Long-term Research	--
10:45	Long-term Research	--
11:00	Long-term Research	--
11:15	Long-term Research	--
11:30	Long-term Research	--
11:45	Long-term Research	--
12:00	Long-term Research	--
12:15	Long-term Research	--
12:30-14:30	Lunch	Lunch
14:30	Long-term Research	--
14:45	Long-term Research	--
15:00	Long-term Research	--
15:45-16:45	RRF Business meeting	--
20:30	Banquet, Awards, Folk Show	
22:00	Dancing party	





SPECIAL EVENTS

Monday, October 21st

Icebreaker Social and Tango Show

18:00 - 21:00

Free to conference registrants, USD \$20 for additional guests

Location: Las Americas Room - Hotel Panamericano

A meeting like this one is not only about raptors: it's about people. There will be many opportunities for networking, reconnecting with old friends and making new ones. Monday evening we will have an icebreaker accompanied by a live tango show, singers and dancers included, so be prepared to TANGO!



Join us for drinks and hors d'oeuvres, hot and cold, at our welcome social. Exhibitors and volunteers will be on hand to welcome you to Bariloche as you network and reconnect with colleagues and friends. A cash bar will be provided.

Tuesday, October 22nd

Special talk **“Everything you wanted to know about Patagonian raptors, but were afraid to ask!”** 16:15 - 17:00

Presented by the local conference co-chairs and committee members, this candid presentation will introduce you to the amazing raptors you can see around Bariloche



Poster sesión and Reception 17:15 - 18:30

Foyer in front of Las Americas Room

Wednesday, October 23rd



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Poster session 17:15 - 18:30

Dinner (after poster reception)

19:30 -21:00

Cost: USD \$40 for all participants

Location: **"La Pinta Choperia"** Address: Corner of 24 de Septiembre y Saavedra streets (we will leave from the Hotel Panamericano Lobby by 19:15, please be ready by 19:00)



Thursday, October 24th

Awards/Appreciation Banquet

Hotel Panamericano (cash bar)

Dinner, Awards and South American Folk Show 20:30

Cost:USD \$50 (Registration and payment for this event will be open until Tuesday night)

After-banquet dancing party!

Las Americas Room 22:00 – 2:00

The after banquet party dancing is included in the fee paid for the attending the banquet. For those not attending the banquet you still can join us after the diner. Cost: USD \$20 for those not attending the banquet and still want to have fun! **(Includes free bar)**



Join us in celebrating the end of the conference!





SCIENTIFIC PROGRAM-Oral and Poster Presentations

Monday 21st, Las Américas Room

Time	Speaker	Presentation
09:30-10:30	KEITH BILDSTEIN	Plenary Talk “Recent abundances in raptor migration in South America versus the rest of the world”
10:30-11:00	Coffee Break	
Neotropic Raptors session		
11:00	*GRETA CERECEDO-PALACIOS	Rehabilitation As a Potential Conservation Strategy For Diurnal And Nocturnal Raptors In Mexico
11:15	*EMILY L. C. SHEPARD	Weather Affects Competitive Ability in a Guild of Soaring Birds
11:30	*GONZALO O. IGNAZI	Black-chested Buzzard-eagle Population Trends in Patagonia and the Possible Relationship with its Main Food Source
11:45	*JORGELINA M. GUIDO	Reversal Learning in the Chimango Caracara (<i>Milvago chimango</i>)
12:00	*J. PETER JENNY	Experimental Restoration of the Harpy Eagle
12:15	*ANDRÉS CAPDEVIELLE	Strategies for Threatened Species Conservation in Argentina: The Crowned Solitary Eagle's (<i>Harpyhaliaetus coronatus</i>) Challenge
12:30-14:30	Lunch (by your own)	
Neotropic Raptors session (cont.)		
14:30	*ELIZABETH K. MOJICA	Post-dispersal Movements and Juvenile Survival of the Solitary Crowned Eagle (<i>Harpyhaliaetus coronatus</i>) in Central Argentina
14:45	*MANUEL ENCABO	Raptors Conservation and Rescue Program: Results and Conservational status of the Crowned Solitary Eagles rescued in Argentina
15:00	* MIGUEL D. SAGGESE	Breeding Biology of Southern Crested Caracaras (<i>Caracara plancus</i>) in Santa Cruz Province, Southern Patagonia, Argentina
15:15	*JAVIER SEOANE	Winners and Losers Among Open-habitat Raptors Due to Agricultural Intensification of Argentina Pampas
15:30-16:00	Coffee Break	
	Neotropic Raptors session (cont.)	
16:00	*JOSÉ H. SARASOLA	Age-mediated Spatial Segregation of Swainson’s Hawks (<i>Buteo swainsoni</i>) in their Wintering Grounds in Argentina
16:15	*FACUNDO BABAR	How Human Constructions Influence the Spatial Distribution of Birds of Prey in Northwest Patagonia
16:30	NRN Business meeting	
16:45	NRN Business meeting	



Monday 21st, Los Jardines Room

Time	Speaker	Presentation
10:30-11:00	Coffee Break	
	Habitat Relationships session	
11:00	*PETRA SUMASGUTNER	Public Information and Ectoparasite Avoidance in the Settlement Decision of the Eurasian Kestrel (<i>Falco tinnunculus</i>)
11:15	*KARINA L. SPEZIALE	Raptors and Introduced Species: An Ambiguous Relationship and Needs for Research
11:30	*STEVEN J. SLATER	Golden Eagle Territory Occupancy and Egg Laying Decline in Relation to Fire and Prey Abundance in the West Desert of Utah
11:45	Withdrawn	Withdrawn
12:00	*MELYNDA A. JOHNSON	Landscape Influences on Survival of Post-fledging Ferruginous Hawk (<i>Buteo regalis</i>)
12:15	*CAMERON J. NORDELL	Anthropogenic Drivers of Behavioral Change in Adult Ferruginous Hawk (<i>Buteo regalis</i>)
12:30-14:30	Lunch (by your won)	
	Falcons of the World session	
14:30	*JUAN MANUEL GRANDE	Intrapopulation Variation in Diet and Habitat Use in a Long-Distance Migrant Raptor: A Year-Round Perspective Using Stable Isotopes
14:45	*PETER B. SHARPE	American Peregrine Falcon Recovery on the California Channel Islands
15:00	*ROBERT L. THOMSON	Breeding System and Ecology of the African Pygmy Falcon: Initial Insights
15:15	*MÁTYÁS PROMMER	Movement Patterns of Saker Falcons (<i>Falco cherrug</i>) from Juvenile Dispersal to Adult Habitat Use Revealed by Satellite Tracking
15:30-16:00	Coffee Break	
	Falcons of the World session	
16:00	*BARRY G. ROBINSON	Multi-scale Forage Selection by the Arctic Peregrine Falcon (<i>Falco peregrinus tundrius</i>): Choosing Foraging Sites and Prey Items
16:15	*DALE W. STAHLECKER	Plumage, Plastic, and Polygyny: Using Color Banding and DNA Tests to Unravel American Kestrel Breeding Strategies
16:30	*JESSI L. BROWN	Habitat Fragmentation Reduces Occupancy of Nest Boxes by an Open-Country Raptor

Tuesday 22nd, Las Américas Room

Time	Speaker	Presentation
09:00-1000	PERTTI SAUROLA	Plenary Talk "Northern owls: from generalist residents to specialist nomads"
10:00-10:30	Coffee Break	



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	Dispersal and Migration session	
10:30	* KENT W. RUSSELL	Early Fall Congregations of Swainson’s Hawks (<i>Buteo swainsoni</i>) in Southern Alberta
10:45	* TORGEIR NYGÅRD	Dispersal, Movements, and Survival of Juvenile Golden Eagles (<i>Aquila chrysaetos</i>) from Northern Norway
11:00	*JASPER WEHRMANN	The Batumi Bottleneck – Massive Scale Migration of Birds of Prey along the Eastern Black Sea Coast, Republic of Georgia
11:15	*MICHAEL LANZONE	Subsidized Lift in Migratory Flight of Golden Eagles (<i>Aquila chrysaetos</i>)
11:30	*TRICIA A. MILLER	Biotic and Abiotic Factors Influencing Directness of Migratory Flight Paths of Golden Eagles (<i>Aquila chrysaetos</i>) in Eastern North America are Scale Dependent
11:45	*DALE W. STAHLECKER	Latitudinal and Altitudinal Shifts by Golden Eagles (<i>Aquila chrysaetos</i>) from the Southwestern United States
12:00	*RICARDO RODRIGUEZ-ESTRELLA	Swainson’s Hawk Small Populations Overwintering In Baja California Peninsula, México
12:15	*PETER H. BLOOM	Spring-Summer, Northern Migration of Red-Tailed Hawks Fledged from Southern Latitudes in the United States
12:30-14:30	Lunch	
14:30-15:15	CHERYL DYKSTRA	Special Talk “Writing a scientific paper for the Journal of Raptor Research: an insider’s guide”
Andesen Awards		
15:15	**LUIS CRUZ-MARTINEZ	Exposure and Heralth Effects of Oil Sands-Related Emissions on American Kestrels (<i>Falco sparverius</i>) in Western Canada
15:30	**JAMES H. JUNDA	Documenting Variation in Parental Response to a Novel Aerial Intruder: A Small Rotary-winged Unmanned Aerial Vehicle (UAV) Used to Survey Nest Contents
15:45-16:15	Coffee Break	
	Andersen Award session (cont.)	
16:15	**CHELSIE L. ROMULO	Global Owl Distribution, Diversity Analysis, and Conservation Hotspots
16:30	**ANDREW J. DENNHARDT	Modeling Migration Counts to Estimate Abundance: A Population Estimate for Golden Eagles (<i>Aquila chrysaetos canadensis</i>) in Eastern North America
16:45	**KYLE H. ELLIOT	Foraging Ecology of Ospreys in British Columbia Revealed by Stable Isotope Analysis
17:00-17:15	Poster setup	
17:15-1815	Poster Session	



Tuesday 22nd, Los Jardines Room

10:00-10:30	Coffee Break	
	Nocturnal Birds of Prey session	
10:30	*SOFI R. HINDMARCH	Do Landscape Features Predict the Probability of Barn Owls in a Changing Agricultural Landscape?
10:45	* KARLA A. BLOEM	Analysis of Variation in the Primary Song of Great Horned Owls (<i>Bubo virginianus</i>) Throughout their Range
11:00	*ANANDA MÜLLER PEREIRA	Blood Parasites in Two Wild Barn Owls (<i>Tyto alba tuidara</i>) from Chile - Case Report
11:15	*BRIAN D. LINKHART	Climate Change Correlates of Breeding Phenology and Reproductive Performance in Flammulated Owls in Colorado, U.S.A.
11:30	*STEVEN R. SHEFFIELD	Population Dynamics and Conservation Status of the Western Burrowing Owl (<i>Athene cunicularia hypugaea</i>) in the United States and Canada: A 15-year Update
11:45	*PERTTI SAUROLA	Life of the Ural Owl (<i>Strix uralensis</i>) and Tawny Owl (<i>Strix aluco</i>) in a Cyclic Environment: Some Results of a 48-year Study
12:00	*RALPH J. GUTIÉRREZ	Short-Term Responses of Spotted Owls (<i>Strix occidentalis</i>) to Forest Fuel Reduction in the Central Sierra Nevada, California U.S.A.
12:15	*JERRY OLSEN	Does the Relative Abundance of Large Versus Small Arboreal Marsupials Determine Sexual dimorphism in Powerful Owls?
12:30-14:30	Lunch	
	Nocturnal (cont.), Palearctic Raptors session	
14:30	*EMILIO MENĐUŠIĆ	Birds of Prey: Research on Decay Changes and Determining the Time of Death
14:45	*RUTH E. TINGAY	The Illegal Persecution of Raptors in Scotland
15:00	*BARTLOMIEJ WOZNIAK	Distribution and Ecology of the Sparrowhawk (<i>Accipiter nisus</i>) in Poland
15:15	*PERTTI SAUROLA	Pan-European Inventory of Raptor Monitoring Schemes in Europe with the Finnish Raptor Monitoring Scheme as an Example
15:30	*RUTH E. TINGAY	Distribution and status of the Pallas's Fish Eagle (<i>Haliaeetus leucoryphus</i>) in Mongolia: A Cause for Conservation Concern?
15:45-16:15	Coffee Break	
16:15-17:00	LOCAL COMMITTEE	Special Talk "Patagonian Raptors"

Wednesday 23rd, Las Americas Room

09:00-10:00	JOHN ELLIOT	Plenary Talk "Raptor Ecotoxicology: Forensic approaches from Peregrines to Vultures and beyond"
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10:00-10:30	Coffee Break	
	Infectious Disease & Pollutants Symposium for Biomedicine	
10:30	*ROBERT RISEBROUGH	Impacts of DDT on Raptor Populations: A Perspective Fifty-one Years After Silent Spring
10:45	*MUNIR Z. VIRANI	Ten Years after Discovery of Diclofenac: Is the Asian Vulture Crisis over?
11:00	*MÁRTON HORVÁTH	Effects of Illegal Poisoning on the Population Dynamics of Eastern Imperial Eagles in Hungary
11:15	*JOHN E. ELLIOT	Terrestrial Birds of Prey are Widely Contaminated with Anticoagulant Rodenticides
11:30	*SOFI R. HINDMARCH	WHooo Can Be Hurt by Rat Poisons... Are Metropolitan Owls at Greater Risk Than Their Rural Counterparts?
11:45	*RUTH TINGAY	Mercury in Grey-headed Fish Eagles and their Prey at the Tonle Sap Lake, Cambodia.
12:00	*JOSEPH G. BARNES	Peregrine Falcons as Biomonitors: Using Feathers to Assess Mercury Contamination in Southern Nevada, USA
12:15	*JERRY OLSEN	Declining Little Eagles Near Canberra, Australia: The Link Between Rabbits and Eagle Breeding Success is a Myth, but is Poisoning From Pindone a Problem?
12:30-14:30	Lunch	
	Infectious Disease & Pollutants Symposium for Biomedicine (cont.)	
14:30	*OLIVER KRONE	Lead Intoxication in Birds of Prey in Germany: A Multidisciplinary Study with Implications for Killing Efficiency of Alternative Ammunition, Hunting Safety and the Health of Venison Consumers.
14:45	*SHANNON BEHMKE	Chronic Lead Exposure is Epidemic in Obligate Scavengers in Eastern North America
15:00	*HEMANTA DHAKA	Probable Threats for Vultures: Impact on the Sustainability of Vulture Safe Feeding Sites of Lumbini and Dang, Nepal
15:15	*GUILLERMO WIEMEYER	West Nile Virus (Flavivirus, Flaviviridae) Activity in Andean Condors and Crowned Eagles from Argentina
15:30	*JASON BROGAN	Persistent Organic Pollutants in the Urban Environment: Exposure and Effects in an Avian Top Predator, the Cooper's Hawk (<i>Accipiter cooperii</i>)
15:45-16:15	Coffee Break	
	Infectious Disease & Pollutants Symposium for Biomedicine (cont.)	
16:15-17:00	Discussions, Networking and Round Tables (attendees may meet with peers in groups as desired)	
17:15-18:15	Poster Session	

Wednesday 23rd, Los Jardines Room

10:00-	Coffee Break
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10:30		
	Vultures and Condors of the World session	
10:30	*HERNAN VARGAS	Breeding and Mortality Records of Andean Condors (<i>Vultur gryphus</i>) in Ecuador
10:45	*VICTOR ESCOBAR-GIMPEL	Patterns of Abundance and Population Structure of Andean Condor (<i>Vultur gryphus</i>) in Foraging Areas of central Chile
11:00	*VICTOR ESCOBAR-GIMPEL	Simultaneous Census of the Andean Condor (<i>Vultur gryphus</i>) in Chile
11:15	*EDUARDO SANTOS	Integrated Conservation of Eurasian Black Vulture (<i>Aegypius monachus</i>) in South-eastern Portugal
11:30	*CAMPBELL MURN	Field Identification of Individual White-headed Vultures Using Plumage Characteristics
11:45	*JEMIMA PARRY-JONES	South East Asian Vulture Crisis – Where We Are Now
12:30-14:30	Lunch	
	Interactions with Energy Infrastructure session	
14:30-15:00	RICK HARNESS	Special Talk “Raptor Electrocutations – Global Issues and Solutions”
15:00	*ALVARO CAMINA	Assessing the Impact of Wind Farms on Raptors: A Worldwide Perspective: South Africa, Chile, and Spain
15:15	*ERIC HALLINGSTAD	Effects of Wind Energy Development on Nesting Ferruginous Hawks (<i>Buteo regalis</i>), Golden Eagles (<i>Aquila chrysaetos</i>), and Bald Eagles (<i>Haliaeetus leucocephalus</i>) in an area of South-central Wyoming
15:30	*JEFF P. SMITH	Initial Responses of Raptors and Other Birds to Development of a Large Photovoltaic Solar Facility in California
15:45-16:15	Coffee Break	
	Interactions with Energy Infrastructure session (cont.)	
16:15	*JESSE L. WATSON	Home Range and Resource Use of GPS-monitored Ferruginous Hawks (<i>Buteo regalis</i>) in Response to Changes in Energy-Development Infrastructure
1630	*W. LOUIS PHIPPS	Home Ranges of Cape Vultures (<i>Gyps coprotheres</i>) and Their Use of Power Lines and Protected Areas in Southern Africa
16:45	*RICK E. HARNESS	Modeling Electrocutation Risk for Raptors and Corvids in California, USA and Rajasthan, India

Thursday 24th, Las Americas Room

09:00-10:00	F. HIRALDO CANO	Plenary Talk “Raptors as ecological models for long lived species research: thirty years of work with the Black Kite (<i>Milvus migrans</i>) in Doñana National Park”
10:00-10:30	Coffee Break	
	Long Term Research Session	
10:30	*PETER H. BLOOM	Natal Dispersal of Red-tailed and Red-shouldered Hawks Banded in



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		Southwestern California: A 40-year study
10:45	*GUY FITZGERALD	A Review of 25 Years of a Raptor Rehabilitation Program in Québec and its Impact on Conservation
11:00	Withdrawn	Withdrawn
11:15	*PATRICIA L. KENNEDY	Long-term Dynamics in Buteo Territory Occupancy on a Privately-managed Bunchgrass Prairie in Northeast Oregon
11:30	*RICHARD T. REYNOLDS	Population Demography of the Northern Goshawk (<i>Accipiter gentilis</i>) on the Kaibab Plateau, Arizona, U.S.A.
11:45	*RYAN M. NIELSON	Monitoring Abundance of Golden Eagles in the Western United States
12:00	*RALF M. KRÜGER	Breeding Montagu’s Harriers in croplands of Bavaria, Germany (1994-2011): A Success Story at the Intersection of Biology, Land Use, Protection, and Public Policies
12:15	*STEVEN COX	Movements and Survivorship of Six Rehabilitated Raptor Species Released in Southwestern United States
12:30-14:30	Lunch	
Long-term Research (cont.)		
14:30	*GUY FITZGERALD	Impacts and Prevention Strategy of Fur Trapping Bycatch on the Bald Eagle (<i>Haliaeetus leucocephalus</i>) and Golden Eagle (<i>Aquila chrysaetos</i>) in Québec
14:45	*PETER H. BLOOM	Vagrant Western Red-Shouldered Hawks: Origins, Natal Dispersal Patterns, and Survival
15:00	*AMAR ARJUN	Investigating the Decline of the Martial Eagle (<i>Polemaetus bellicosus</i>) in South Africa
15:15-15:45	Coffee Break	
16:00-17:00	RRF Business meeting	





PLENARY SPEAKERS



Dr. Keith Bildstein, Sarkis Acopian Director of Conservation Science, Hawk Mountain Sanctuary, Kempton, Pennsylvania, USA

“Recent abundances in raptor migration in South America versus the rest of the world”

Keith L. Bildstein is Sarkis Acopian Director of Conservation Science at Hawk Mountain Sanctuary in Kempton, Pennsylvania, where he oversees the Sanctuary’s conservation science and education programs, and coordinates the activities of its graduate students, international interns, and visiting scientists. He received his B.S. in Biology at Muhlenberg College, in Allentown, Pennsylvania, in 1972, and his Masters and Ph. D. in Zoology from the Ohio State University, in Columbus, Ohio, in 1976 and 1978. He currently is Adjunct Professor of Wildlife Biology at the State University of New York-Syracuse. He was Visiting Assistant Professor of Biology at the College of William and Mary, in Williamsburg, Virginia, in 1978, and Distinguished Professor of Biology at Winthrop University in Rock Hill, South Carolina, from 1978 to 1992. He is a Fellow of the American Ornithologists’ Union, and has been President of the Wilson Ornithological Society and the Waterbird Society, and Vice-president of the Raptor Research Foundation. Bildstein edited the Wilson Bulletin, a quarterly journal of ornithology, from 1984 through 1987, and was a member of the editorial board of The Auk, the AOU’s journal, in 1997-2000. He has helped organize the scientific programs of seven national and seven international ornithological meetings. Bildstein has authored or coauthored more than 100 papers in ecology and conservation, including 40 on raptors. His books include *Raptor Watch: a Global Directory of Raptor Migration Sites* (2000 [with Jorje Zalles]), and *Migrating Raptors of the World: Their Ecology and Conservation* (2006), among others.



Prof. Dr. Pertti Saurola, Emeritus Researcher, Finnish Museum of Natural History, University of Helsinki, FINLAND

“Northern owls: from generalist residents to specialist nomads”



Professor Pertti Saurola has been, since his retirement in 2001, an emeritus researcher at the Finnish Museum of Natural History, University of Helsinki. During 1963–1973 Saurola worked as an assistant teacher at the Zoological Institute of the University of Helsinki and concentrated his activity particularly on the reformation of the curriculum of ecology. During 1974–2001 Saurola was the Head of the Finnish Bird Ringing Scheme, Finnish Museum of Natural History. Saurola was elected as a Board Member of EURING (European Union for Bird Ringing) during 1977–1999 and was the President during 1981–1995. Saurola has been deeply involved in all birds of prey conservation and research in Finland. In 1965, he started a long-term population study on the Ural Owl and the Tawny Owl. As the Head of the Ringing Scheme Professor Saurola strongly encouraged the ringers to gather data on birds of prey. He started the population monitoring projects Pandion (1971–), Raptor Grid (1982–) and Raptor Questionnaire (1986–) and has been, since the start, an active member of the Finnish White-tailed Eagle, Golden Eagle, Peregrine and Gyrfalcon national working groups. Saurola has published more than 200 scientific articles. The book *Sääksi (The Osprey)* won the State Award for Public Information in 1987 and *Suomen Pöllöt (Owls of Finland)*, edited and largely written by Saurola, was in 1995 one of the main candidates for Tieto-Finlandia Award. In 2013, the *Finnish Bird Ringing Atlas Vol. I* was published as a joint effort by Saurola, Jari Valkama and William Velmala.



Dr. John Elliott, Science & Technology Branch, Environment Canada, Pacific Wildlife Research Centre, Delta, BC, Canada
“Raptor Ecotoxicology: Forensic approaches from Peregrines to Vultures and beyond.”

John Elliott has been a biologist or research scientist with Environment Canada for more than 30 years. Located mainly at the Pacific Wildlife Research Centre in Delta, British Columbia, the focus of his work has been wildlife ecotoxicology. He has a long history of work with raptors including lab studies for his M.S. on American kestrels at Carleton University and his Ph.D. work on contaminants in bald eagles at the University of British Columbia. In addition to many studies of eagles, he has investigated contaminants and related ecological questions in osprey, accipiters, peregrines and a number of owl species. The application of science to the development of regulatory and consensus



solutions to environmental contamination problems has been a long-term passion. He has actively engaged in regulatory proceedings around topics such as lead projectiles, pulp mill pollutants, pesticides, rodenticides and flame retardants. His work on lead poisoning in eagles led to the first ban on lead shot for waterfowl hunting in Canada by the Province of British Columbia in 1996; his work contributed to the eventual national-level Canadian ban. Elliot's research on pesticide poisoning of raptors in the Fraser Valley resulted in the banning of three highly toxic insecticides. As adjunct professor at the University of British Columbia and Simon Fraser University, he has supervised many graduate students engaged in field and laboratory ecotoxicological research; these include current studies of barn owls and Cooper's hawks. He has lectured and given courses in wildlife toxicology in North America and Europe. His publication record includes over 150 peer reviewed papers, book chapters and reports, more than 50 of which focus on raptors.



Dr. Fernando Hiraldo Cano, Consejo Superior de Investigaciones Científicas, Departamento de Biología de la Conservación, Estación Biológica de Doñana, Sevilla, España
“Raptors as ecological models for long lived species research: thirty years of work with the Black Kite (*Milvus migrans*) in Doñana National Park”

Dr. Fernando Hiraldo Cano is a Professor of Research at Consejo Superior de Investigaciones Científicas (CSIC), Conservation Biology Department, Doñana Biological Station (EBD), Sevilla, Spain. He received both a B.S. in Biology and Ph. D. in Biology from Universidad de Sevilla. He built his scientific career at EBD starting as an intern in 1970. From 1979 to 1986 he obtained a post doc at Madrid National Museum of Natural Sciences. In 1987 he returned to the EBD as a Scientific Researcher and in 1991 he became a Professor of Research. From 2000 to 2012 he was the Director of the Doñana Biological Station and the Institutional Coordinator of the CSIC in Andalusia. Dr. Fernando Hiraldo Cano has authored and co-authored more than 200 papers, book chapters and reports in ecology and conservation with a strong focus on raptor studies. He performed different research projects with raptors in several countries around the world, including France, Germany, United Kingdom, Holland, Italy, Mexico, Argentina, Bolivia, Kazakhstan, Morocco, Mauritania, Mali and Australia. Dr. Fernando



Hiraldo Cano was awarded the “The Fran and Frederick Hamerstrom Award” in 2001 by the Raptor Research Foundation for his fruitful career in raptor science. He was also awarded the “2004 Prize to Scientific Research in Conservation Biology” by the BBVA Foundation as a member of the Research Group in Biology and Conservation of Birds and Habitats from the EBD. In 2009 Andalusia government awarded him with the Gold Medal.

SPECIAL TALKS



Richard E. Harness, Certified Wildlife Biologist, EDM International, Inc. Fort Collins, Colorado, USA

Special talk: “Raptor Electrocutions – Global Issues and Solutions”

Rick Harness is a Certified Wildlife Biologist working with EDM International, Inc., an employee owned consulting company located in Fort Collins, Colorado. He has an M.S. degree from Colorado State University in Fishery and Wildlife Biology where he conducted his thesis on raptor electrocutions. In addition to his biological education, Rick has five years experience designing power lines and 30 years experience managing projects associated with protecting wildlife in their interactions with energy facilities. He is a contributing author to *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and collaboratively works on these issues both nationally and internationally.



Dr. Cheryl Dykstra, Raptor Environmental, West Chester, Ohio, USA

Special talk: “Writing a scientific paper for *The Journal of Raptor Research*: an Insider’s Guide”.

Cheryl Dykstra earned her Ph.D. in Wildlife Ecology and Zoology from the University of Wisconsin-Madison in 1995. She has worked for the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency and now is an independent researcher studying urban/suburban raptors, primarily Red-shouldered Hawks and Barred Owls. Her research interests include urban/suburban populations, reproductive success, habitat use, population dynamics,



I Worldwide Raptor Conference, October 2013, Bariloche, Argentina



behavioral ecology, diet, and ecotoxicology. Cheryl is Editor-in-chief of *The Journal of Raptor Research*.



ACKNOWLEDGEMENTS

An event of this magnitude is not hatched from the work of a few. Rather it is the result of many dedicating themselves to long hours, months and years of planning; embraced in a positive atmosphere including tons of humor (necessary to survive the experience!), everyone involved worked tirelessly to accomplish goals so that the conference would run smoothly from beginning to end. Without this help, the I Worldwide Raptor Conference would not be possible. We would like to thank all who dedicated time and resources to the planning and our conference. In the following paragraphs we identify those whose help we can remember; we know there may be some we forget to name. Please, let us know if this is the case. To those friends and colleagues we give our sincere apologies and say thanks for all you did!

Delegates, please take a few minutes to learn who was involved in this adventure. Their aim was to provide you with an exciting and enjoyable time that you will never forget.

Thanks to **CRUB-Universidad Nacional del Comahue** for hosting the conference.

Raptor Research Foundation's President **Ruth Tingay**, current and past **Officers** and **Board of Directors** for believing in us from the beginning. Your support, encouragement and trust since we proposed this conference was essential to making it possible.

Special thanks to **The Peregrine Fund**, its **Board of Directors**, and its vice-president **Rick Watson** for supporting this joint conference from idea to reality. We extend this acknowledgement to the **Neotropical Raptor Network** advisory committee and its representative **Martha Curti. Cindy Thiel**, accountant at The Peregrine Fund was essential in arranging and making payments all over the world.

We are also grateful with Dr. **B. Meyburg** and the **World Working Group on Birds of Prey and Owls** for joining us; this is the first time in the history of WWGBP that its international conference has taken place on the South American continent.

Our dedicated sponsors **Sia-Comache Nation/Ethno-Ornithological Initiative**, **NorthStar Science and Technology**, **Ecotone**, **Lotek** and **Administracion de Parques Nacionales**, **Ministerio de Turismo de la Nacion Argentina**, **Cau Cau excursiones** provided generous support for this conference. We are eternally grateful. Moreover, we encourage all



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delegates to visit sponsor booths and web sites to learn more about them. Please thank them for supporting raptor research and conservation by their presence.

There are always a special people that make impossible deeds happen. In this category we certainly include the **RRF Conference Committee**. Its members are **Kate Davis** (Chair), **Elizabeth (Libby) Mojica** and **Dan Varland**. You were always there, behind the scenes, when we needed help. Without you, this meeting would not have been possible. To Libby, we local co-chairs offer special thanks for setting up online registration and for uploading information to the website. We recognize your patience, help and support. Thank you Libby!

James Dwyer and **Ana Trejo** lead the efforts that conducted to have an excellent Scientific Program. **Brian Smith** provided additional help with abstract review and formatting. The program includes more than 150 oral and poster presentations from all around the world. The effort to organize this unique Scientific Program was enormous. We extend our sincere thanks to the Scientific Program Committee.

Special thanks to our Pleanery Speakers **Keith Bildstein**, **Pertti Saurola**, **John Elliot**, and **Fernando Hiraldo** for their contributions. We extend these thanks also to our two special speakers **Cheryl Dykstra** and **Richard Harness**.

Workshops organized by the **Early Career Raptor Researchers** (ECRR) are becoming a common and welcome pre-conference activity for RRF so we wanted to provide the same experience for delegates attending this joint conference. Travis Booms, ECRR chair, who resides in Alaska, helped organize these workshops in Patagonia. What could be more challenging than that? Thank you very much Travis! We cannot forget the workshops presenters for contributing their expertise: **Pete Bloom**, **James Junda**, **David Bird**, **Libby Mojica** and **Oliver Krone**. A word of acknowledgement to those that were planning to teach at the workshops but for reasons beyond their control were unable to attend the conference.

Ines Croce and **Lorenzo Symposn** took the lead in planning the field trips. Thank you so much for everything you did to make these events a great success. **Gonzalo Ignazi** made possible the photo exhibition and helped to design the banners and screen savers you will see. **Fernando Ballejo** is the local artist responsible for the black-and-white silhouettes and vinetes included in the program and on the tote bag.



I Worldwide Raptor Conference, October 2013, Bariloche, Argentina



Generously volunteering time before and during the conference were **Ana Trejo, Lorenzo Sympson, Gonzalo Ignazi, Facundo Barbar, Agustina Di Virgilio, Ines Croce, Pablo Alarcón, Fernando Ballejo, Nicolás Lois, Gala Ortiz, Karina Speziale, Agustin I. Quaglia, Maite Amoros.**

College of Veterinary Medicine, Western University of Health Sciences, Pomona, USA, Universidad Nacional del Comahue and CONICET provided the intellectual stimulus and physical infrastructure to the chairs and contributed in several ways to the organization of this conference. Laboratorio Ecotono provided the physical space for many of the logistic activities for this conference.

Photos in the scientific program and on the conference website are courtesy of **Juan Teloni, Ricardo Moller Jensen, Carlos Cabrera, Ramon Moller Jensen, Fabian Llanos, Facundo Vital, Diana Weyland, Jorge Martin Spinuzza, Gonzalo Ignazi, Heraldó Norambuena Ramirez, Darío Fernández Bellon, Lalo Navarro, Evangelina Indelicato, Alex Morici, Ines Croce, and Miguel D. Saggese**

We also want to recognize all the support provided by our families for the long hours we were away physically and mentally while organizing the conference. Thank you very much for your oceans of patience, for supporting our dreams and for being there when we most needed you.

Conference delegates: thank you for making this conference possible. Without your support this unique international event would have remained just a dream. **Bariloche City:** Thank you for welcoming us!

Enjoy the conference! **Miguel D. Saggese, Valeria Ojeda and Sergio L. Lambertucci, Local Conference Chairs**



Your conference co-chairs, left to right: Miguel D. Saggese, Valeria Ojeda and Sergio Lambertucci



CONFERENCE VENUE

HOTEL PANAMERICANO BARILOCHE

Av. San Martín 536/70 (R8400ALS)

San Carlos de Bariloche, Río Negro, Argentina

The Hotel Panamericano Bariloche is located a stone's throw away from the Nahuel Huapi lake and the foothills of the Andes Mountains and only a few miles (less than 10 minutes drive) from Bariloche International Airport and Bariloche Bus Station. The Hotel has ample and cozy bedrooms overlooking the Nahuel Huapi lake and the city and has promotional pricing for meeting attendees.



Looking upon the majestic Nahuel Huapi lake, this dynamic hotel is a five-star hotel with the largest capacity in Patagonia and the best choice to enjoy the breathtaking nature of the region. The Panamericano Bariloche Hotel welcomes its guests with warm personalized attention and has a suitable infrastructure to welcome both the tourist and the business person. The hotel is in a privileged location in the center of this emblematic city of Patagonia, a destination that is appealing both because of the diversity of its programs as well as for the beauty of its landscapes, which the traveler will begin to enjoy just by putting their head out the room's window.





Moderators: thank you very much for your help!

PETRA SUMASGUTNER

JESSI L. BROWN

TORGEIR NYGÅRD

GARY SANTOLO

SOFI R. HINDMARCH

RUTH E. TINGAY

ROBERT RISEBROUGH

OLIVER KRONE & JOHN ELLIOT

JEMIMA PARRY-JONES

RICK E. HARNESS

MIGUEL D. SAGGESE

JOAN MORRISON

ELIZABETH MOJICA



ABOUT BARILOCHE, ARGENTINA

San Carlos de Bariloche, usually known as **Bariloche**, is a city in the province of Río Negro, Argentina, situated in the foothills of the Andes on the southern shores of **Nahuel Huapi lake** and is surrounded by the **Nahuel Huapi National Park**. After an extensive public works and architectural buildup the city emerged in the 1930s and 1940s as a major tourism centre with ski, trekking and mountaineering facilities apart from numerous restaurants, cafés and chocolate shops. The city has a permanent population of 108,205 according to the 2010 census.

Bariloche has a cool Mediterranean climate with dry, windy summers and rainy winters, which grades to an alpine sub polar oceanic climate at higher altitudes. Generally speaking, the summer season (mid-December to early March) is characterized by long stretches of windy, sunny weather, with pleasant afternoons of 18 to 26 °C (64 to 79 °F) and cold nights of 2 to 9 °C (36 to 48 °F). Autumn brings colder temperatures in March, then stormier weather in April and May. By mid-May the first snows fall, and winter lasts until early September, bringing stormy weather with mixed precipitation (snow, rain, sleet), occasional snowstorms and highs between 0 and 12 °C (32 and 54 °F), lows between -12 and 4 °C (10 and 39 °F). Spring is very windy and variable; temperatures may reach 25 °C (77 °F) in October and then plummet to -6 °C (21 °F) following a late-season snowfall. On average, there are a handful of snowy days between 5 and 15 centimeters (2 and 6 in) every year, and many more days with mixed precipitation. Bariloche is the starting point for visiting Western Patagonian National Parks such as Nahuel Huapi National Park, Los Glaciares National Park, Los Arrayanes National Park, Los Alerces National Park, Lanin National Park, Lago Puelo National Park, Perito Moreno National Park, Nahuel Huapi National Park

Established in 1934, the **Nahuel Huapi National Park** is the oldest national park in Argentina. It surrounds **Nahuel Huapi lake** in the foothills of the Patagonian Andes. The largest of the national parks in the region, it has an area of 7,050 km² (2,720 sq mi), or nearly 2 million acres. Its landscapes represent the north Patagonian Andean Zone consisting of three types, namely, the Altoandino (with perpetual snow above an altitude of 1,600 meters (5,200 ft)), the Andino-Patagónico (in the lower reaches of the hills) and the Patagonian steppe. It also represents small parts of the Valdivian Forest. The national park is dominated by the high mountain chain of the Andes, many lakes, rapid rivers,



waterfalls, snow-clad peaks, glaciers and extensive forests. It is bordered by Chile on its western side.



The park derives its name from the lake which it surrounds, namely the “Nahuel Huapi”. In the Mapuche language, nahuel means “jaguar” and huapi means “island”. The existence in past times of jaguars in this area is controversial.

The largest city and a base for tourism is **San Carlos de Bariloche**, which is surrounded by the park. San Carlos de Bariloche is the main hub when visiting the lake, and is known as the “Gateway to Patagonia”, the “Chocolate Capital” and the “Honeymoon Capital” of Argentina. However, the city and other settlements are zoned outside the limits of the park. A further subzoning into the north, south and southern zones has been implemented with an exclusive recreational area named the Cerro Cathedral. Villa La Angostura is another lakeside resort also within the boundaries of the park.

The area is known as the Argentine Lake District, as there are many lakes in the park, including Nahuel Huapi, Mascaradi, Gutierrez, Traful, Guillermo, and Perito Moreno Lakes. Cerro Catedral is a 2,388 metres (7,835 ft) high peak within the park and an important ski resort. Cerro Tronador, on the Chilean border, is the highest mountain in the park at 3,491 metres (11,453 ft). Bordering the park to the north is the Lanín National Park. The park’s ecology consists of Patagonian steppe at lower elevations and Valdivian temperate forests at higher elevations. It is notable for its rich wildlife due to its many biotopes, attributed to the varied altitude and precipitation range.

Patagonian flora and fauna



Xerophytic Patagonian flora is dominant in the eastern half of the park while the western half is covered profusely with temperate rain forests. The dominant tree species in the park are the lengas (*Notophagus pumilio*), coihue (*N. dombeyi*), and the ñires (*N. antarctica*). Other varieties of trees seen in the park are the Chilean cedar (*Austrocedrus chilensis*), Winter's bark (*Drimys winteri*), and Patagonian cypress, a slow-growing conifer which is also present. Other flora includes arrayanes, the caña colihue reeds, amancayes and arvejillas. The llao llao fungus has irregular growth patterns on the trees and is a symbol of the area; it is also the name of the Llao Llao Hotel, a famous resort. The Valdivian rain forest is well forested with fine arrayan trees with crumbling bark. Bamboo cane grows in abundance.

Animals include river otters (*Lontra longicaudis*), southern Andean huemuls (*Hippocamelus bisulcus*), and pudus (*Pudu pudu*) the smallest cervid of the world and formerly considered endangered, two species of foxes, cougars, guanacos and maras. Huillín (*Lontra provocax*), an endangered native otter, can be observed in the park. Avifauna reported include Magellanic Woodpeckers, green Austral Parakeets, Chaiques (*Pterocnemia pennata*), geese, ducks, swans, blue-eyed cormorants, raptors and many species of softbills such as the Austral Robin (*Turdus falcklandicus*).



WORKSHOPS

Workshops are scheduled before the conference begins on Sunday October 20th. Pre-conference activities are optional and are not included in the Conference registration fee. Each workshop will be an additional USD \$5. Workshops will be conducted at Universidad del Comahue, Bariloche. Workshops will provide hands-on training to students, early career researchers, and others interested in learning more about raptor research techniques. These events are being sponsored in part by the **Early Career Raptor Researcher Committee of RRF**. Committee chair **Travis Booms**

Workshops will be held at Universidad del Comahue. The way from the hotel to the workshop venue is about 20 blocks, all within Bariloche town center, and taxis between these two places cost 6-7 Us\$. If you decide to walk, it is a very nice walk, especially on the way back (it is all downwards) and if weather helps.

Biomedical Field Research: Study Design and Sampling Techniques

Course Description: This class is addressed to students with interest in field research regarding health aspects of birds of prey. We will discuss study design, considerations that must be made prior field work and different methods to access the birds to be sampled. Techniques how and where the sample will be taken, processed, transported and stored will be explained. Interpretation and conclusions of results will be followed by an interactive discussion.

Instructor: Oliver Krone

Time: 10:00-12:00

Class Size: 25

Raptor Trapping Techniques

Course Description: This class will cover the proper use, construction, and design of a number of the most commonly used raptor trapping techniques including mist nets, bal-chatris, verbails and others. The course will be a combination of interactive powerpoint presentations, discussion, and hands-on examples of some of effective raptor traps.

Instructor: Pete Bloom

Time: 10:00-12:00

Class Size: 25



Applications of Unmanned Vehicle Systems to Raptor Research and Management

Course Description: Small unmanned aircraft systems (UAS), formerly exclusive to militaries, are rapidly advancing in sophistication and availability to civilians. Ranging from hand-launched autonomous airplanes to miniature self-stabilized helicopters, they are increasingly being employed in such areas as agriculture (e.g. crop assessment, herd monitoring), emergency services (e.g. wildfire surveillance, search and rescue), meteorology (e.g. hurricanes, air pollution sampling), oceanography (e.g. sea-ice dynamics) and geophysics (e.g. volcanoes, landscape studies). A number of potential applications for small UAS in the field of raptor research and management include conducting population surveys, tracking radio-tagged animals, sensing and observing animals in sequestered or dangerous places, mapping and monitoring raptor habitats, and deterring nuisance species. The aim of this workshop is to introduce biologists and managers to the potential and limitations of using Unmanned Vehicle Systems for raptor research and management with possible live demonstrations of use of a quad rotor.

Instructors: David Bird and James Junda

Time: 13:00 – 15:00

Class size: 25

Harnessing Raptors with Transmitters

Course Description: This class will cover the process of attaching a transmitter (either VHF or satellite) to raptors, from initial thoughts of the bird's welfare to specifics of making harnesses and attaching them to birds. The majority of the class will be hands-on, involving creation of a backpack-style harness and using that harness to attach a transmitter to carcasses of different sized raptors. As time allows, we may discuss other attachment techniques (e.g., tailmount, patagial) as well as thoughts on data management. If available, please bring samples of transmitting supplies and harnesses from your own projects for discussion with the class.

Instructor: : Libby Mojica

EARLY CAREER RAPTOR RESEARCHERS (ECRR) COMMITTEE AND ERRC WORKSHOPS



I Worldwide Raptor Conference, October 2013, Bariloche, Argentina



The Raptor Research Foundation (RRF) Early Career Raptor Researchers (ECRR) Committee is hosting a day of raptor research skills short courses for ECRRs at the annual RRF meeting. Classes are primarily available to students and early career professionals, but everyone is welcome.

The goal of the short courses is to provide student and early career RRF members unique, hands-on training in raptor research techniques that is not typically available through traditional college-level courses or text books. Often, the success of a research project can depend largely on the application of nuanced skills, such as knowing when a telemetry harness fits properly and when it does not. Such field research skills are best learned through intimate, one-on-one training provided by an experienced expert. We hope to provide this kind opportunity to RRF's developing researchers so they may apply these skills in their own research and ultimately improve the quality of research conducted on raptors.

In addition to providing technical training, we also hope the short courses will provide an opportunity for spontaneous synergies and networking by participants and teachers alike by sharing their collective experiences. Because students and early career professionals may not have ready access to colleagues and experts in their chosen fields, the short courses will provide unique opportunities to students and early career professionals to network with others at similar stages in professional development and with those more experienced in raptor research techniques.



Abstracts - Poster Sessions (alphabetically)

Harpy Eagle (*Harpia harpyja*) Nesting Territories in Brazilian Forests

**F. HELENA AGUIAR-SILVA (aguiarsilva.fh@gmail.com), TÂNIA M. SANAIOTTI, OLIVIER JAUDOIN, BENJAMIM B. LUZ, FREDERICO D. MARTINS, GISELE LEANDRO SOUZA, MARJA Z. MILANO
Programa de Pós-Graduação em Ecologia, Programa de Conservação do Gavião-real, Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil.

Habitat loss and human persecution are the two main factors that have led the Harpy Eagle (Accipitridae) to globally become a near-threatened species, and have a high conservation concern over its entire geographic range. Research on the biology of the Harpy Eagles in Brazilian forests began in 1997. By 2006, 40 breeding areas were mapped, after which efforts were focused on public awareness campaigns, rescue initiatives and the release of rehabilitated Harpy Eagles into the wild. Currently, 109 Harpy Eagle nesting territories have been mapped, 54 of which are active as of 2013: 91% in the Amazon forests, 6% in the Atlantic Forests, 3% in the Cerrado and 1% in the Pantanal biomes. Because it is infeasible to monitor all nests during every year, we have collected data from about 44 nests per year since 2009. About 60% of these nests produced offspring during these years. Of the 109 nests found, only 21% were located in a protected area and 9% were destroyed leaving the breeding pairs without their nest. These observations lead us to conclude that the Harpy Eagle population is vulnerable and strictly dependent on nest-site protection. The nesting territories of other large bird of prey species which co-occur with the Harpy Eagle, such as the Crested Eagle (*Morphnus guianensis*) ($n = 9$) and Ornate Hawk-Eagle (*Spizaetus ornatus*) ($n = 5$) have been mapped, are being monitored and are also conservation targets. Considering that the majority of Harpy Eagle nests mapped are outside protected areas, the key to the success of the efforts to promote the proper conservation of this species is to have the active support of the local communities which inhabit the Harpy Eagle nesting territories.



Catastrophic Events as Pulsed Resources Scenarios for Scavengers: Andean Condors Dealing with Volcanic Eruption-Induced Mass Deaths

****PABLO A. E. ALARCÓN** (paealarcon@gmail.com), Laboratorio Ecotono, INIBIOMA (Univ. Nacional del Comahue-CONICET), Argentina / **The Peregrine Fund**, Boise, Idaho, U.S.A. **SERGIO LAMBERTUCCI**, Laboratorio Ecotono, INIBIOMA (Univ. Nacional del Comahue-CONICET), Argentina. **JOSÉ ANTONIO DONÁZAR** and **FERNANDO HIRALDO**, Estación Biológica de Doñana, CSIC, España. **JOSÉ ANTONIO SANCHEZ-ZAPATA**, Departamento de Biología Aplicada, University, Miguel Hernández, España. **GUILLERMO HERVAS BLANCO**, Dpto Ecología Evolutiva, Museo de Historia Natural, CSIC. **JUAN MANUEL MORALES**, Laboratorio Ecotono, INIBIOMA (University Nacional del Comahue-CONICET), Argentina.

Catastrophic events are large spatially extended, infrequent and unpredictable phenomena promoting sudden and unexpected changes in ecological systems. Given their characteristics, these phenomena often produce a sharp increase of mortality rates in ecosystems, which could translate into food pulses for scavenger animals. Our aim was to evaluate the effect of mass deaths of medium-to-large herbivores (mainly livestock) caused by the Puyehue-Cordón Caulle eruption in 2011 on foraging patterns of a top scavenger, the Andean Condor (*Vultur gryphus*). Our hypothesis was that the volcanic ash fall after the eruption produced a food pulse for condors which would have led them to modify their foraging patterns. For this, we used a map of ash-deposits thickness as a proxy of the “disturbance level” throughout the study area. To describe the foraging patterns of condors, we tagged 10 individuals with GPS telemetry units and monitored them before and after the eruption. Under a use-availability design, we generated control points and assessed changes in foraging habitat preferences through time by fitting binomial regression models with ash thickness and time as predictors. We found that the probability of using different foraging areas depended on time. During the two months immediately after the eruption, when the highest mortality of fauna was recorded, the areas more affected by ashes were more likely to be used, indicating the eruption-induced food pulse translated into a short-duration switch in the foraging habitat preference of condors. This increase in food probably benefited condors in the short term, although a posterior period of strong food declining may have resulted in a disadvantage with demographic implications, typical of pulse events. Our study provides an empirical evidence of animal behavioral responses when faced with rapidly changing conditions such as those prevailing during catastrophes.

Monitoring the Potential Risk of Electrocution of Raptors in a Suburban Area of Central Chile

SERGIO ALVARADO (fcojsantan@gmail.com), División de Epidemiología, Escuela de Salud Pública, Facultad de Medicina, Universidad de Chile, Santiago de Chile, Chile. ***FRANCISCO SANTANDER**, Laboratorio de Ecología de Vida Silvestre, Facultad de Ciencias Forestales y Conservación de la Naturaleza, Universidad de Chile, Santiago de Chile, Chile. **RICARDO FIGUEROA**, Laboratorio de Entomología Forestal, Instituto de Silvicultura, Facultad de Ciencias Forestales, Universidad Austral de Chile, Valdivia, Chile. **MACARENA ROA**, Ilustre Municipalidad de Calera de Tango, Santiago de Chile, Chile. **VICTOR ESCOBAR**, Pontificia Universidad Católica de Chile, Santiago de Chile, Chile. **PIERO**



RAMÍREZ, NUALIK BURUCKER, TATIANA VUSKOVIC, EDUARDO NAVARRO and ANDREA MINOLETTI, Universidad Mayor, Santiago de Chile, Chile.

A number of studies have demonstrated that power lines are responsible for a high incidence of injuries or death, by electrocutions or collisions, of large-bodied raptors including endangered species. Mortality caused by power lines could negatively affect the distribution and density of raptors. Up to date, the effects of power lines on raptors in Chile have not been assessed. Between September 2010 and February 2011 we conducted a study to evaluate injury and mortality caused by power lines in Lonquén, central Chile. We made monthly counts (2 days per month) in two fixed-radius (500 m radius) count-points and two variable-wide transect lines (2 km length). Our objectives were to: 1) determine the composition and richness of raptor species on the area; 2) estimate the relative abundance of raptors; and 3) collect information of electrocution incidents that affect raptors. On the basis of 269 h of observation we detected 11 species of raptors in the study area (7 in count-points and 8 in transect lines). The most frequent species were the Black-chested Buzzard-eagle (*Geranoaetus melanoleucus*) (n=35), Chimango Caracara (*Milvago chimango*) (n=26), Harris's Hawk (*Parabuteo unicinctus*) (n=12) and Variable Hawk (*Buteo polyosoma*) (n=8). Species with an apparently higher breeding activity were the Black-chested Buzzard-eagle (5 active nests), Harris's Hawk and American Kestrel (*Falco sparverius*) (2 active nests, respectively). No evidence of raptor electrocutions or collisions was recorded during all the study period. Nonetheless, our results suggest that the Black-chested Buzzard-eagle and Harris's Hawk are species with a higher potential to suffer collisions/electrocutions principally due to its abundance, activity and large body size. Because that our study was conducted in a reduced area in a short period of time further research is needed to verify occurrence of collisions and electrocution caused by power lines at a more extensive spatial and temporal scale.

Trophic Niche Overlap Between Raptorial Scavengers in Patagonia: New Support for the Competition Hypothesis

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Animals sharing resources typically use different foraging strategies to decrease potential competition. Avian scavengers can segregate resources into different space and time scales. However, when the species do not co-evolve, such segregation may initially require competition. We studied the trophic niche overlap of three species of obligate raptorial scavengers, one of which recently increased in abundance. We conducted our study in northwestern Patagonia, where there are several scavengers, Andean Condors (*Vultur gryphus*), Turkey Vultures (*Cathartes aura*) and Black Vultures (*Coragyps atratus*) are the main consumers of carcasses. Black Vultures **arrived in the area relatively recently and expanded following human activities**. Competition between Black Vultures and **threatened** Andean Condors has been suggested. **Therefore, it is important to understand trophic overlap between these species**. We collected pellets ($n = 440$) from roosts of both vultures species. We determined all taxa consumed and estimated **food niche breadth (Levins Standardized Index)** and **diet similarity** (Pianka



overlap index). We compared results with data on the diet of Andean Condors from the literature. Our results indicate Turkey Vultures have greater amplitude in the selection of carcasses and, incorporating livestock, fish, reptiles, carnivores, mice and a great number of birds in their diets. Although Black Vultures included arthropods in their diet, they fed primarily on introduced ungulates, overlapping more with condor diets at roosts far from urban centers. These two species may switch their competitive advantages due to size when Black Vultures are abundant, and can colonize the carrion. Because these species share resources, human activities that positively affect the abundances of Black Vultures could increase competition, with the possible implications for conservation of Andean Condors.

Home Range and Habitat Use by Tropical Screech Owls (*Megascops choliba*) in a Cerrado Reserve, Southeastern Brazil

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The Tropical Screech Owl is a small nocturnal raptor inhabiting a large range of habitats throughout Brazil. Although it is one of the most abundant owls in Brazil, information on its spatial ecology and natural history is scarce in the literature. In this study, we radio-tracked four male Tropical Screech Owls to estimate home range sizes and habitat use in the Ecological Station of Itirapina, a reserve within the Cerrado Region (savanna-like vegetation) in southeastern Brazil. The mean (\pm SD) home range size was 51.2 (26.9) ha using Minimum Convex Polygon (MCP), and 80.8 (40.2) ha using Fixed Kernel (FK) 95% estimates. The mean core area was 22.4 (8.8) ha (FK 65%). During the day, gallery forests and patches of invasive pines were preferred for roosting. During nocturnal activities, the Tropical Screech-Owl preferred semi-closed cerrado land covers, for example “campo cerrado” and “cerrado *senso strictu*” – both types of woodland savannas, and avoided more open land covers, such as “campo sujo” – grassland savanna. Our results for nocturnal habitat use confirm previous assumptions in the literature. Our data are the first to describe home ranges of Tropical Screech Owls. Home ranges were similar to other screech owls in North America and the small differences of area requirements among species may be related to body mass and habitat structure. The large variation in individual home ranges found in our study may be explained by habitat heterogeneity and individual social status.

Hematological and Biochemical Blood Parameters in captivity Black-chested Buzzard-eagle (*Geranoaetus melanoleucus*) from the Metropolitan region, Chile

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The Black-chested Buzzard-eagle inhabits both slopes of the Andes, from Venezuela to Tierra del Fuego. Hematology and blood biochemistry profiles are important diagnostic tools in raptors species. The aim of this study was to determine the hematological and biochemical blood parameters in 31 captive Black-chested Buzzard-eagles from a rescue center for birds (CRAR) in Talagante, Chile. Hematological results (mean \pm standard deviation) were: 2.3 ± 0.4 erythrocytes ($10^6 / \mu\text{L}$), packed cell volume (PCV) $42.7\% \pm 3.3$, hemoglobin (Hb) 119 ± 12.6 (g / L); 7733 ± 3227.2 total leukocytes (μL), heterophiles 4403 ± 2058.9 (μL), eosinophils 441 ± 406.9 (μL), basophils 8 ± 24.1 (μL) 2417 ± 1361.9 cells (μL) , 464 monocytes (μL) 32117 ± 15776 thrombocytes (μL). Blood chemistry results were: 20 ± 11.1 ALT (U/L), 145 ± 30.7 (U / L), 20 ± 15.7 (U/L), 103 ± 76.1 (U / L) 487 ± 243.6 CK (U/L) 719 ± 608.4 Amylase (U/L), total protein 34 ± 5.8 (g/L), cholesterol 6 ± 1.5 (mmol/L), triglycerides 1 ± 0.2 (mmol/L) glucose 24 ± 5.8 (mmol/L), calcium 2 ± 0.4 (mmol/L), phosphate 1 ± 0.3 (mmol/L) , Chloride 130 ± 20.9 (mmol/L), magnesium 1 ± 0.1 (mmol/L) and uric acid 327 ± 204.8 ($\mu\text{mol/L}$). There are no reports of thrombocytes counts, plasma protein concentration or blood minerals in Black-chested Buzzard-eagles. Rodriguez et al. (2010) working with 11 individuals reported lower values of erythrocyte and leukocyte counts, PCV and Hb. Highest activities of ALT, AST, GGT, FA, Amylase and higher concentrations of uric acid were recorded in the present work. This work contributes to the knowledge of the clinical pathology of the Black-chested Buzzard-eagle, can be used as a reference in future research.

The Role of Stimulus Complexity and Experience in the Expression of Exploratory Behavior in a Generalist Bird of Prey, the Chimango Caracara (*Milvago chimango*)

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Exploration represents an important way by which organisms evaluate environmental information. Animals are increasingly exposed to novel environmental conditions because of human activities. The decision of whether or not an animal should investigate environmental changes involves a trade-off between the risk and the potential benefit of novel resources. The resultant decision may influence learning about the environment. We analyzed in a Neotropical raptor, the Chimango Caracara, how external (complex vs. simple objects) and internal factors (with vs. without experience with similar objects) might influence novel object exploration based on cost-benefit considerations. Our findings showed that in Chimango Caracaras, complexity did not affect the initial exploratory response: a similar percentage of adults and juveniles explored both simple and complex objects, and the time from exposure through approach and contact with objects did not vary between object types. However, total exploration time and number of exploratory events were higher for complex objects than for simple objects, particularly in juvenile birds. These results indicate that the decision-making processes regarding exploration in Chimango Caracaras was guided more by the benefits of a higher quantity of information provided by exploring complex objects, compared to simple ones, than by the risks associated to this activity. Experience led to a decrease in exploration only when simple objects were under consideration. We hypothesize that for Chimango Caracaras simple objects were easier to process



and recall than complex ones, so further exploration of simple objects would not provide additional benefits. We conclude that Chimango Caracaras cope with novel features of their surroundings with a novelty-seeking strategy. This characteristic of generalist species, like Chimango Caracaras, is critical for discovering early changes signaling new resources opportunities, and might be a determining factor for the ability to respond adaptively to environment modifications.

Nest-site Characteristics and Reproductive Performance of Long-winged Harrier (*Circus buffoni*) Nesting in Halophytic Grasslands of Argentina

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Long-winged Harriers inhabit open fields, grasslands, savannas, wetlands and marshes in South America. In southeastern Argentina, Long-Winged Harriers show high dependence on halophytic tall grasslands for nesting. During six breeding seasons (August-March) we studied characteristics of nesting site and reproductive performance in this species. Nests ($n = 85$) were built on the ground, below plants of *Spartina densiflora* ($n = 43$), *Cortaderia selloana* ($n = 29$) or *Juncus acutus* ($n = 13$), and had at least one access ramp. Nests associated with different vegetation types differed in the height of the vegetation surrounding the nest-site, the presence of a ceiling-like structure and the number of access ramps. The internal diameter, internal cup depth and height of the nest edge did not show significant differences between vegetation types. Average clutch size was 3.38 ± 0.89 ($n = 85$; range: 2-5 eggs). Hatching success (number of egg that hatched versus number of egg laid) was 0.69 ± 0.39 , and breeding success (number of fledglings versus number of nestlings hatched) was 0.56 ± 0.40 . Productivity was 1.38 ± 1.28 fledglings per pair. Modeling the relationship between vegetation and nest structure with reproductive parameters we observed that the elevation from the ground of the nest explained variability in the productivity of this species. Because other reproductive parameters were not explained by the factors tested, nest elevation can be seen as an important factor underlying breeding success in Long-winged Harriers in particular, and perhaps in ground nesting raptors in general. That is, for a ground nesting raptor, not only the number and diversity of predators present in the breeding area influences offspring survival, but also nest height and thick cover are variables that probably affect reproduction.

Comparative Winter Diet Analysis of a Great-Horned Owl (*Bubo virginianus*) Reveals a Potential Mechanism for Regulating *Microtus* Populations

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Small vertebrates constitute a large part of the diet of Great-Horned Owls, and since prey skeletons are regurgitated in pellet form, a simple diet analysis can provide a baseline representation of local population levels. Combined with climate patterns, these data can help identify and predict fluctuations



in local mammal populations. This information has economic implications since *Microtus* species and other small mammals regularly part of owl diets, cause damage to agricultural crops. Thirty regurgitated pellets from a single Great-Horned Owl at the Airlie Center, Virginia, U.S.A. were collected and analyzed for number of species, number of individuals, and lengths of the most identifiable bones (mandibles and femora). Local climate data from 2010-2012 was used to explain fluctuations in the diet of *Bubo virginianus* in relation to baseline population levels of small mammals. We discovered that the meadow vole (*Microtus pennsylvanicus*) is the staple of this owl's winter diet, which may be correlated with years in which there were higher than average temperatures and precipitation. Meadow voles comprised 86% of the diet in 2011 and 66% in 2012. The short-tailed shrew (*Blarina brevicauda*) comprised 11% of the diet in 2011 while the least shrew (*Cryptotis parva*) comprised 20% of the diet in 2012. Pellet thickness increased from 19.69 ± 0.99 in 2011 to 22.11 ± 1.19 in 2012 ($p = 0.010$). The mean number of individuals per pellet also increased from 1.54 ± 0.66 to 2.86 ± 0.66 between the two years ($p < 0.001$), suggesting the owl was an older, larger individual in the second year of our observations. Here we propose that the damage caused by small mammal populations on agricultural crops could be better regulated by the presence and conservation of raptors around croplands. Therefore, our results may contribute to the improvement of future agricultural pest management strategies.

Brazilian Owls: A Review of Taxonomic Diversity, Distribution, Ecology and Conservation

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We compiled literature describing the 23 Brazilian owl species, which represent almost one third of all Neotropical owls. Our main objective was to review the taxonomy, distribution, ecology and conservation for each species, both revealing gaps in our knowledge and supplying directions to promote more research on Brazilian owls. We examined 254 publications where we found that most (47.9%) of all topic citations ($n = 428$) were about diet, behaviour and distribution, but mainly based on notes or articles with poor detail or without data quantification. Taxonomy and genetics were respectively 6.8% and 2.6% of all topics. Notably, studies on population ecology and habitat use are also rare: only 7.9% of all topic citations. Reproductive biology, another key issue, is poorly studied with only 8.9%, most of which reported observations of only part of the reproductive cycle. When it comes to citations by species, only five had more than 40 each, together accounting for 50.6% of all citations. Moreover, ten species, mostly forest owls, had fewer than 20 citations each. Biomes like Amazon Forest, Caatinga and Pantanal had the fewest owl publications. Though in the last decade there has been an increasing number of publications on owls in Brazil, particularly on food habits, we show that other essential data about distribution, taxonomy, population density, habitat requirements, reproductive biology and anthropogenic effects are absent or almost absent for most owl species, particularly for those inhabiting forested habitats. We hypothesize the lack of basic biological information on nearly all owl species in Brazil explains the relative absence of owls in the Brazilian official lists of threatened fauna in regional and national scales.

Human Perception is Threatening Andean Condors (*Vultur gryphus*) in San Juan, Argentina



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People's perception about a species is one of the several aspects involved in human-wildlife conflicts. Thus, knowing what people think about a concerned species is relevant to understanding and managing human-wildlife conflicts. The Andean Condor is a global "near threatened" species that presents serious conservation problems throughout its distribution. Andean Condor-human relationships could be one of these problems in places where they coexist. To know what people think about the Andean Condor, and to understand which factors influence people's perception about the species, during 2010-2012 we surveyed 112 settlers (66 men, and 46 women) in Valle Fértil, San Juan, Argentina. Settlers' perception was negative; 81.3% of them considered the condor an injurious species and 91% believed condors could depredate on livestock. Factors that significantly influence settlers' perceptions were their gender, age, educational level and occupation, but the main factor was their relationship with livestock farming (70% of surveyed people rear or reared livestock); 77% reported to have lost livestock through condor attacks, but only 33% claimed to have seen the attack. Regarding condor conservation, 64% of surveyed people estimated that condor population is decreasing due to hunting. While few settlers reported having hunted a condor (14%, possibly biased by the fear for punishment), several knew people who currently hunt them (31%) or had hunted condors some years ago (38.5%). Although 63.2% of surveyed settlers thought condors should be conserved, the negative perception about condors, mainly from ranchers, is a real threat to its conservation. Hence, we suggest implementing awareness programs and environmental education campaigns to change the negative perception and reduce the threat to the condor population.

Nest-site Fidelity and Breeding Notes in Double-toothed Kite (*Harpagus bidentatus*) at a Costa Rican Foothill Forest Site

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The Double-toothed Kite inhabits Neotropical forests from southern Mexico to southeastern Brazil and eastern Bolivia. We studied nesting behavior of Double-toothed Kites in the Tenorio Volcano National Park region in Costa Rica for three breeding seasons (2011-2013). The objective of this study was to describe and document nest site fidelity of this species on a foothill in a rainforest of the Pacific slope. The nest was discovered in late March 2011, it was located 38 m high in a *Spirotheca rosea* (Bombacaceae) hemiepiphytes bush and it was monitored from a skywalk bridge. The nest was simple and rather fragile, built with dry branches of *Inga* species. Both sexes participated in the construction of the nest. The couple aggressively defended the nest from potential predatory bird species and tolerated non-predatory species. The nest was located 417 m from the active nest of an Ornate Hawk-Eagle (*Spizaetus ornatus*). Two more nests were recorded in *Spirotheca rosea*, one in a neighboring bush 8 m



northeast (2012) and another in the same place (2013). Clutch sizes ranged from one to two eggs with reddish brown spots. The incubation period lasted up to 38 days. Only one chick survived from all broods except for the second nest (2012) which was destroyed. Nestlings were fed in proximity to the nest for up to 28 days post hatch. In addition to our findings, sporadic reports of reproductive behavior of this species were reported in other areas of the country. The nesting dates here coincided with that reported by other authors, but not so the color of the eggs. We report fidelity of this species for both nesting site and tree species in a Costa Rican foothill forest site.

Temporal Patterns of Vocal Activity of Tawny-browed Owl (*Pulsatrix koeniswaldiana*) in a Fragment of Lowland Atlantic Forest in Rio de Janeiro State, Brazil

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For nocturnal birds living in structurally complex environments, such as forest owls, vocal activity is important for long-distance communication. The Tawny-browed Owl is a medium-sized species, endemic to the Atlantic forest of southeastern Brazil and adjacent areas of Paraguay and Argentina. It inhabits moist lowland and montane forests, is strictly nocturnal, lives in pairs that maintain territories and vocalize year-round. The vocal repertoire of adults is poorly known and the voice of immatures is completely unknown. After leaving the nest, young remain nearby for several months, initially fed by their parents, and later, no longer fed but tolerated by adults. We examined nightly and seasonal variation in vocal activity of adults and juveniles monthly from January 2011 to December 2012 in the Reserva Biológica União, a 3200 ha protected area covered mostly by old-growth humid evergreen forest, where Tawny-browed Owls are relatively common. During 72 nights from sunset to sunrise, we recorded gender, age (adult or juvenile), type of vocalization and number of vocalizing birds. Both adults and immatures vocalized throughout the night and showed a trimodal activity distribution that was clearer in 2011. Increased vocal activity by adults probably motivated via attraction and maintenance of breeding pairs, and defense of hunting territories and nesting sites, coincided with the reproductive period, which begins in July or August and lasts until March. In late fall and throughout the winter, vocal activity of adults exhibited the lowest levels. Conversely, the vocal activity of juveniles, probably begging for food, was higher during this period of the year. It is also seemingly necessary to advertise their presence in the area, through the issuance of repetitive screams, until the time of dispersal. We thank CNPq for Financial support.

The Ecological Role of Southern Caracaras (*Caracara plancus*) and Black-chested Buzzard-eagles (*Geranoetus melanoleucus*) as Long Distance Secondary Seed Dispersers

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Secondary seed dispersal is a multistep system affecting plant population dynamics that includes two or more dispersal processes increasing the distance over which seeds of plants may establish in new sites. Here we evaluated the trophic relationships between two raptor species, the Southern Caracara and the Black-chested Buzzard-eagle, and one non-raptor, the Eared Dove (*Zenaida auriculata*). We particularly assessed if this predator-prey interaction facilitates long distance dispersion of seeds of two plant species, the red grass (*Amaranthus quitensis*) and the annual bugloss (*Lycopsis arvensis*), in semiarid forest of central Argentina. We captured doves to sample seeds contained in their crops. We simultaneously collected pellets of the two raptors species and a control sample of seeds directly from plants. All seeds were examined for viability and germination. A total of 789 and 918, and 511 and 1834, red grass seeds and annual bugloss seeds were found in the pellets of caracaras ($n = 83$) and eagles ($n = 98$) respectively. The viability of seeds obtained from plants was 91% and 95%, with a germination rate of 87% and 57% for red grass and annual bugloss respectively. Viability and germination of seeds obtained from dove crops was 72% and 91%, and 41% and 45%, for red grass seed and annual bugloss, respectively. Red grass seeds found in the pellets of caracaras and eagles had a viability of 35% and 40%, and a germination of 34% and 38%, respectively. Annual borage showed a viability of 9% and 89%, and a germination of 7% and 14%, respectively. Our results indicate that though passage of seeds through raptor's guts may reduce germination and viability, raptors are able to disperse seeds of these two plant species, conferring to these raptor species an overlooked and key ecosystem function other than their role as top predators.

Lead Toxicosis in California Condors (*Gymnogyps californianus*) Admitted for Rehabilitation at the Los Angeles Zoo: A Retrospective Case Series Study (1995-2012)

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Reintroduction of the California Condor to the wild has been one of the most successful management programs of endangered wildlife. With multiple facilities working together to repopulate the wild population of this critically endangered species, the California Condor has come a long way since 1982 with only 22 condors remaining to over 400 condors in 2012. However, the mortality rate of these birds in the wild still exceeds levels that allow the free-ranging population to become self-sustaining. Currently, the most prevalent cause of death of the adult California Condor continues to be chronic lead toxicity. This study is a retrospective, descriptive, ecoepidemiological case series of California Condors affected by lead toxicosis presented at the Los Angeles Zoo between the years 1995 and 2012. The purpose of this study is to advance the understanding of how epidemiological variables, radiographic findings, and different chelation therapies influence successful release back into the wild. Preliminary results of this study suggest California Condors from southern and central California appear to be affected by lead toxicosis independently of age, gender, and other epidemiological variables. Most birds present, independently of initial blood-lead levels, with no clinical signs and are successfully released. Additionally, radiographic findings have no association with initial lab lead levels and successful release. Lastly, the majority of condors were successfully treated with the administration of CaEDTA and fluids, resulting in a successful release back to the wild. These preliminary results provide a better



understanding of the overall historical description of lead toxicosis in California Condors and how therapy to release these birds has been able to sustain the current population. This project serves as a basis for further research and will allow biologists, conservationists, and veterinarians to analyze and find improved solutions to minimizing the current risks affecting California Condors.

Testing Raptor and Corvid Perch Deterrents on Electric Power Poles

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Predation of grouse by raptors and corvids perching on utility poles is a concern in some areas. Perch deterrents may offer a mitigating strategy if deterrents reduce the frequency or duration of perching. To investigate the effects of various perch deterrents, we deployed deterrents on 5 power poles retained for use in this study when 33 power poles were removed from grouse habitat. We rotated deterrents among power poles every 15-28 days ($\bar{x} = 19.4$ days) from 17 November 2011 through 20 November 2012, so all deterrents occurred multiple times on all poles. We compared perch frequency and duration on 4 pole caps, 3 insulator deterrents, an untreated control crossarm, and 5 crossarm-length deterrents: Pupi crossarms mounted at a 22.5° angle from horizontal, Birdzoff deterrents, an experimental shroud, Power Line Sentry X deterrents, and Zena Designs mini-spike deterrents. We collected 862 independent records of perching events. Raptors and corvids perched most often ($\chi^2 = 146.0$, $P < 0.0001$) on untreated crossarms ($\bar{x} = 0.60$ perches/day), and insulator deterrents ($\bar{x} = 0.47$ perches/day). They perched least often on pole caps with spikes ($\bar{x} = 0.11$ perches/day), and Zena Designs mini-spikes ($\bar{x} = 0.10$ perches/day). Perching events were shorter on pole caps with spikes and Zena Designs mini-spikes compared to all other treatments ($F_{8,853} = 23.53$, $P < 0.0001$). Prey captures also were significantly less likely from treated crossarms than from the control crossarm ($\chi^2 = 86.5$, d.f. = 4, $P < 0.0001$). Birds attempting to perch on deterrents often flapped their wings broadly where energized conductors would have existed if the poles had not been decommissioned. On energized poles, electrocution would have been possible in this situation. When perch deterrents are used, insulation or isolation of energized equipment must also be installed to minimize electrocution risk.

Could the North American Experience Contribute to Reducing Avian Electrocutions in Europe? Patterns in Raptor and Non-raptor Avian Electrocutions in Andalucía (Southern Spain)

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Avian electrocution on overhead power lines is an ongoing concern of global conservation importance. Raptors in particular are at risk of electrocution due to their large size. We analyzed data on avian electrocution collected January 2003 through March 2013 in Andalucía, Spain. We compared patterns in raptor and non-raptor electrocutions by structure type, species group, and location. We distinguished five structure types, all of metal construction, and recorded 19 species of electrocuted raptors, including



Bonelli's Eagles (*Hieraaetus fasciatus*; n = 28), Golden Eagles (*Aquila Chrysaetos*; n = 4), and Spanish Imperial Eagles (*Aquila adalberti*; n = 9), with 329 raptor electrocutions total, and 207 non-raptors. Proportionally, electrocutions were most common on pylons with transformers or circuit breakers. Electrocutions also occurred relatively frequently on pylons with either jumper wires above insulators or with insulation of phases < 1 m. Electrocutions were relatively infrequently on pylons with phases staggered on three different levels and on pylons with pin insulators and no other equipment. However, the greatest raw number of electrocutions occurred on pylons with pin insulators, especially for raptors (n = 134 electrocutions). Raptor electrocutions were detected more commonly in western Andalucía (n = 209), and less commonly in eastern Andalucía (n = 19), likely because populations of large eagles and vultures are greater in the western part of the region. High numbers of electrocutions on pylons with only pin insulators contrasts sharply with data from North America, where pylons in similar habitat supporting similar electrical loads are typically constructed of wood, not metal, thus minimizing phase-to-ground contacts. Because wood poles can be a limited resource to utilities in southern Spain, avian electrocution in Andalucía may be most rapidly reduced by expanding existing retrofitting programs to incorporate new, longer, and more comprehensive insulation measures.

Spatio-Temporal Variation in Abundance, Density and Species Richness of Diurnal Raptors in Cuba: The Effects of Man-made Environments

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In neotropical islands the intensity of human activity has altered the natural structure and richness of avian communities, strongly affecting endemic species, including raptors. Despite these effects, studies of neotropical islands raptors are limited as compared to temperate and continental regions. During the breeding and non-breeding season of 2012, we conducted a survey in natural and human-transformed areas of the island of Cuba to determine whether or not Cuban raptors have similar patterns of ecological responses to human activity as observed in continental raptors. Raptors strongly varied in relation to habitat, with lower richness, abundance, and density in more transformed areas. Species richness was 11, mostly in natural areas. However, habitat types within each zone reflected equal numbers of species for natural coastal vegetation, mangroves and human-transformed grasslands. In farm lands and forests 82% and 91% of species were detected, respectively, while in urban areas we detected only three species. Generalist species had abundances and densities higher in anthropogenic areas during both seasons, whereas specialist species were only present in natural areas. The relative abundance differed between seasons for generalist species, with higher numbers occurring during the non-breeding season. Higher species richness in human-transformed areas appeared to be the result of high landscape diversity in these sites, preventing or relaxing competitive exclusion. Specialist species congregated in natural areas. Under insular conditions land use changes can be a major threat for raptor habitat specialists compared to what has been observed in the continent. Even some generalist raptors could be affected in island conditions by land use changes if their ecological thresholds are exceeded. Conservation of raptors in these kinds of ecosystems will be discussed.



Evaluating Risk of Electrocution to Endangered Solitary Crowned Eagles (*Harpyhaliaetus coronatus*) in Central Argentina

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The Solitary Crowned Eagle is one of the largest eagles of South America and is categorized by the IUCN as a globally endangered species. Habitat loss and fragmentation, and direct persecution have been identified as the main threats for the species. Electrocution and collisions on power lines pose important threats to large birds of prey worldwide. In Argentina, there are records of electrocuted Solitary Crowned Eagles, but no systematic assessment has been done to quantify the potential impact of this mortality factor to this eagle. We quantified mortality by electrocution of Crowned Eagles and other birds and identified the most dangerous types of electricity pylons at six different sections of power lines at semiarid forest in central Argentina. From November 2011 to December 2012, we visited the power lines six times. We described the structural design (type of material used for construction, presence and position of jumpers, type and position of insulators, size of crossbeam) of 3114 electricity pylons throughout 355 km covering an area of approximately 12000 km² that supports around 30 breeding territories of Solitary Crowned Eagles. We found 35 dead individuals of three bird families: Psittacidae 48.6%, Cathartidae 37.14% and Accipitridae 14.3% (the five individuals being Solitary Crowned Eagles). Such records represent 25 singular electrocution events (1.4 birds/event). Regarding birds of prey, most electrocution events occurred on pylons with jumpers above the crossbeam (96%) and on concrete pylons (84%). This is highly relevant because only 2% of the inspected pylons had jumpers above the crossbeam and 10% were concrete pylons. All electrocution events were associated with rigid insulators above the crossbeam or horizontal insulators. Our results thus prove that electrocution is a relevant cause of mortality for Solitary Crowned Eagles in our area, and urgent mitigation actions are needed to reduce this mortality factor.

Living with the Enemy: Does the Honey Buzzard (*Pernis apivorus*) Select Nest-sites to Avoid Predation by Northern Goshawk (*Accipiter gentilis*)?

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Preferences for nest-sites in birds of prey have presumably evolved in relation to local habitat resources and interspecific interactions. Selection of suitable nest-sites is essential for successful reproduction. In eastern Austria, we tested the importance of these two components in nest-site selection by the Eurasian Honey Buzzard in two different study areas: the mixed fragmented coniferous forests in southern Burgenland, and the extensive deciduous forests along the Danube River in Lower Austria. In each area, we compared macro- and micro-habitat features between nest-sites and randomly selected plots. Interestingly, there was almost no difference between nest-sites and random plots, indicating that



the Honey Buzzard does not appear to base its choice of nest-sites on habitat considerations. Rather, Honey Buzzards placed their nests significantly further from Northern Goshawk nests than random plots. Northern Goshawks are the main predator of other medium-sized raptors like Honey Buzzards. Furthermore, data from both study sites show that predation was higher in territories that were closer to breeding Northern Goshawks. We did not detect such an effect for breeding Common Buzzards (*Buteo buteo*), which does not prey on Honey Buzzard but will defend its nesting area against Honey Buzzards. Additionally, we detected no correlation between any of the habitat variables and loss of young. We conclude that although Honey Buzzards have a clear preference for forests, their choice of nest-sites appears to be driven by avoidance of intra-guild predators.

The Recovery of Golden Eagle (*Aquila chrysaetos*) in the Biosphere Reserve Xurés-Gerês of Northwestern Spain: An Effort to Conserve Endangered Species

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Golden Eagles are among the most threatened species of vertebrates in Galicia (northwestern Spain), which implies the need for a specific recovery plan to ensure its conservation in the region. Environmental protection policies adopted in the Transboundary Biosphere Reserve Xurés-Gerês, allowed the Government of Galicia, in collaboration with Grupo de Rehabilitación de la Fauna Autóctona y su Hábitat, to undertake a conservation program for this raptor. The main objective of this program was to establish a minimum viable population in this area which would contribute to the recovery of the species in other areas in Galicia. Between 2001–2012, 18 juveniles were “hacked”, and 12 of them returned to Xurés-Gerês after the dispersal period. Three territorial pairs settled in the reserve, and a fourth pair settled in a mountainous area of eastern Galicia. At present, six individuals are equipped with Argos-GPS system, with VHF radio-telemetry as a backup. During 2009–2012, these eagles provided between 1,268–2,864 locations, and 56–84% of the locations were recorded in protected areas from historical territories in Galicia. Young eagles selected mainly open areas with sparse vegetation, natural grasslands, and shrublands. Adult eagles used rocky and forest habitats as roosts. Use of telemetry provided relevant data about space use, dispersal, response to supplementary feeding, mortality and return frequency data, which provides valuable information to assess the interactions of hacked birds with wild individuals. The conservation program was complemented with awareness campaigns, focused mainly on the local communities. Other correction measures, such as modification of dangerous power lines, curtailment of poisons or specific habitat improvements, have been adopted to further minimize direct mortality, increase the survival of released individuals at an early stage of dispersal, and promote their philopatry to Galicia.

Phylogeny and Taxonomy of the Booted Eagles (Accipitriformes: Aquilinae)

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We present a supermatrix phylogeny of all bootied eagles based on an analysis of published sequences from six loci, including all 38 extant species of bootied eagles and one extinct species (Haast's Eagle, *Harpagornis moorei*). We find molecular support for five major clades within the bootied eagles: *Nisaetus* (10 species), *Spizaetus* (4 species), *Clanga* (3 species), *Hieraaetus* (6 species) and *Aquila* (11 species), requiring generic changes for 14 taxa. Additionally, we recommend that the Long-crested Eagle (*Lophaelagus occipitalis*) and the Black Eagle (*Ictinaetus malayensis*) should be kept in their own genera, as they are morphologically very distinct. The clade including the Bootied Eagle (*H. pennatus*), Little Eagle (*H. morphnoides*), Pygmy Eagle (*H. weiskei*), Ayres's Eagle (*H. ayresii*) and Wahlberg's Eagle (*H. wahlbergi*) can be kept in the genus *Hieraaetus* as it does not result in paraphyly in the genus *Aquila* any longer if the spotted eagles are placed in the new proposed genus *Clanga*. The Rufous-bellied Eagle should be placed in the genus *Lophotriorchis*. To make consistency in the English names, we recommend that "hawk-eagle" should be used only for species in the genera *Nisaetus* and *Spizaetus*. We suggest the following new names: Cassin's Eagle (*Aquila africana*), Bonaparte's Eagle (*A. spilogaster*), Ayres's Eagle (*Hieraaetus ayresii*), and Black-and-chestnut Hawk-Eagle (*Spizaetus isidori*).

Morphometric and Morphologic Description of Crowned Solitary Eagle (*Harpyhaliaetus coronatus*) Spermatozoa: Working towards Development of a Suitable Freezing Protocol

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The Crowned Solitary Eagle is an endemic species from South America. In Argentina, it is considered an endangered species by the International Union for Conservation of Nature (IUCN), and is included in Appendices to the Convention on International Trade in Endangered Species (CITES). One of the limiting factors to developing a conservation strategy for this species is the overall lack of information on its natural history and actual status. In order to develop a comprehensive management plan for the species (either free or captive), it is important to incorporate use of reproductive biotechnological tools to conserve genetic variability. Here, we describe the morphological and morphometric characteristics of Crowned Solitary Eagle spermatozoa, obtained by using a standard protocol for sperm extraction and cryopreservation. This method was selected for being non-invasive. We collected sperm from one sexually mature male (13 yr old) housed at the Buenos Aires Zoo. The sampling period lasted three consecutive years, ranging from August to November (considered to be the reproductive period for the species) each year. During that period, we obtained 25 samples (attempted twice per week), and we cryopreserved one of these sperm samples. We also describe morphological and morphometrical descriptions of eosine-nigrosine, coomassie blue smears, and glutaraldehyde fixed samples, and illustrate head, middle piece, and tail (length and width). The present study is complementary to current studies to improve biotechnology on reproductive physiology and cryopreservation protocols carried out in our laboratory, with the aim of preserving genetic diversity of Crowned Solitary Eagle.

Monitoring Endangered Crowned Solitary Eagles by Satellite Telemetry in Southeastern Brazil: Trapping, Home Range and Records of Human Persecution



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From November 2009–March 2012 as part of a Crowned Solitary Eagle (*Harpyhaliaetus coronatus*) conservation project, we made monthly attempts to capture Crowned Solitary Eagles. We conducted our study in the Cerrado Region of Minas Gerais State, southeastern Brazil. Currently, this area is a mosaic of natural areas comprised of savannas and forests, intermixed with monocultures (mostly coffee) and pastures. In May of 2010, we trapped a 3-yr old female (3.5 kg) and attached a 60-g solar satellite transmitter. After 30 d of transmission, the eagle had used a 71 km² area, but was found injured near a road. An x-ray showed five shotgun pellets, with one between the phalanx of left wing, two in the left thigh, and two in the coccyx. In March of 2012, we trapped a second female eagle (≤ 6 mo old; 2.5 kg) and installed a 40-g solar satellite transmitter. This young eagle has remained in its natal area, being frequently observed among a family group. The home range (minimum convex polygon) over the first 6 mo for this juvenile eagle was 103 km², and was 125 km² after 1 yr of monitoring. In spite of the use of both anthropogenic and natural areas of Cerrado, most records were associated with natural patches. The capture of these eagles using a modified goshawk trap was apparently the first reported in the literature. This trap is more efficient than bownet and bal-chatri traps when used for non-breeding individuals. Our study documented persecution (i.e., shooting) of a Crowned Solitary Eagle, which can be a major threat for such a large-bodied, endangered raptor species. The data obtained through this project are not only important to Cerrado Region, but also to conservation of this large and endangered eagle.

Reintroduction of the Ridgway's Hawk (*Buteo ridgwayi*) in Dominican Republic

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The critically endangered Ridgway's Hawk is one of the most endangered birds of prey in the world with a global population of less than 300 individuals. It is endemic to Hispaniola, and restricted to a karst region of eastern Dominican Republic. The breeding stronghold is located in Los Haitises National Park (LHNP) where major threats are habitat loss from agricultural activities, uncontrolled fires, hunting and human persecution. A subset of the population is monitored annually during the breeding season in LHNP where 35-50 territorial pairs are known. Reintroduction of Ridgway's Hawks consisted of an "assisted dispersal" release method where 5-6 wild hatched young at approximately 35-40 days of age were collected from nests and transferred to release boxes established at two private protected areas: Loma la Herradura (Central Romana Corporation), El Seibo Province, which was the last known record (1970s) for the species outside of the Los Haitises region, and Punta Cana, La Altagracia Province. Young selected for release were of similar ages, capable of feeding themselves, banded and fitted with backpack-mounted VHF radio transmitters. Young hawks remained in the release box from one to two weeks to adjust to their surroundings, and then were released at an average of 45-50 days of age. Young



hawks were fed and monitored daily at release boxes until they became independent and dispersed at 14-18 weeks of age. From 2011 and 2012, 21 individuals (10 females, 11 males) were released with overall 90% survival to dispersal, 45% survival rate for young released in 2012 during their first and second years, and 60% survival rate for young released in 2013. In 2013, at the Punta Cana release site, the first nesting pair was confirmed of a male from 2011 and a female from 2012 releases. Currently, this pair has one nestling.

SARA-listed (Species At Risk Act) Barn Owls (*Tyto alba*) in British Columbia: Genetic Diversity, Connectivity, and Divergence

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The western population of Barn Owls in Canada is confined to the southwestern corner of British Columbia (BC), and is considered the most northern peripheral distribution in North America. This population is currently experiencing multiple anthropogenic stressors, such as loss and fragmentation of their grassland and agricultural habitat, mortality from vehicle collisions, and poisoning by rodenticides. Consequently, the BC Barn Owl population has declined from approximately 1000 mature individuals in 1983 to 250–500 in 2008, and was recently classified as *Threatened* on the Species At Risk Act (SARA) by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). There is growing concern that with this current trend, the BC Barn Owl population may soon be extirpated. Therefore, we assessed whether its genetic diversity is compromised due to the declining number, and determined its degree of connectivity with other more robust populations in the adjacent state of Washington (WA), U.S.A. Preliminary results using five polymorphic microsatellite markers showed that the BC population does not exhibit significantly lower genetic diversity ($H_{EXP} = 0.788$, allele/locus = 10.0) when compared to the non-threatened population in western Switzerland ($H_{EXP} = 0.775$, allele/locus = 12.2). Furthermore, there is no evidence of inbreeding as the observed heterozygosity ($H_{OBS} = 0.725$) was not markedly lower than expected. These results suggest that the BC population is not isolated, but rather receives sufficient gene flow from the neighboring population in WA to maintain its high genetic diversity. However, this cannot be confirmed until individuals from WA are genotyped. We also will be using mitochondrial markers to identify genetically distinct populations, and to determine if the Cascade Mountains are acting as a biogeographic barrier between Barn Owl populations of the northwest coast and the rest of the US.

Comparative Diet of Long-eared Owls in central Pennsylvania: A Temporal Approach

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Long-eared owls (*Asio otus*) are found in central Pennsylvania (PA) during their winter migration southward from Canada. We collected pellets from a population of long-eared owls roosting in Lewisburg, PA over three time periods: December 2003 to early December 2004, late December 2004 to early December 2005, and late December 2005 to May 2006. We analyzed 100 randomly-selected



pellets from each collection period ($N = 300$, $n = 100$) to characterize the diet of Long-eared Owls during these periods. Cranial and post-cranial remains were used in identification of prey items, and were compared to reference collections and *ad hoc* keys. Three different species were found in the pellets: *Blarina brevicauda*, *Peromyscus leucopus*, and *Microtus pennsylvanicus*. The majority of the prey taken by Long-eared Owls during the specified time periods was *M. pennsylvanicus*, comprising over 93% of their diets ($p < 0.001$). Our results suggest that either the studied population of Long-eared Owls feed preferentially on the *M. pennsylvanicus*, or that these owls are opportunistic and *M. pennsylvanicus* was the most abundant prey item during three consecutive years.

Diurnal Raptors in Human-transformed Habitats of Tlaxcala, México

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Raptors often are considered good indicators of habitat quality because raptors are sensitive to human disturbances to the environment. Responses of raptors to different degrees of habitat transformation are variable, but for many species it is known that once habitat loss exceeds a threshold of tolerance, populations decrease and may become locally extinct. The aim of our study was to determine the spatial and temporal patterns of distribution and abundance of diurnal raptors along an altitudinal gradient containing natural and human-transformed areas in the La Malinche National Park in Tlaxcala, México. In general, since autumn 2011, we recorded 683 sightings of 10 raptor species. We recorded 10 species using different vegetation types and areas influenced by human activity, with a total of 241 sightings. In human-modified environments (urban and crop landscapes) we recorded the highest species richness, abundance and diversity of species (Modified area: 149 sightings, 10 species, $H' = 1.80$; Natural: 92 sightings, eight species and $H' = 1.46$, t-student $H' = 3.05$, $p < 0.05$). Preliminary results indicate that the species of raptors we studied apparently benefitted from agricultural areas. We observed a decrease in the richness, abundance, and diversity of species moving up the altitudinal gradient. The same trends were observed during breeding season. We discuss our results observed between human-transformed and natural areas.

Environmental Contaminants in Feather of Avian Scavengers from Patagonia, Argentina

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Individual organisms, populations, biocoenoses and ecosystems are naturally influenced by many stressors. Exposure to environmental pollutants like organohalogen compounds and heavy metals has frequently been associated with population declines in several species. This has led to legal restrictions



and subsequent decreases of pollutant concentrations both in the environment and in bird tissues. The relatively low cost of insecticides and predominant productive activity in American countries, make organochlorines (OC) the most used pesticides in agricultural and phytosanitary control programs in South America. For raptors, OC consumption from prey, together with lead consumption from carcasses, can be very high in areas such as Patagonia, Argentina, where commercial hunting is increasing. Nevertheless, contaminant studies of raptors in Argentina are scarce. The aim of this study was to estimate exposure to these compounds in raptors in Patagonia, Argentina. We tested for OC pollutants including hexachlorocyclohexane (HCH) isomers, endosulfan, aldrin, dieldrin, endrin, dichlorodiphenyltrichloroethane (p,p'-DDT), dichlorodiphenyldichloroethane (p,p'-DDD), dichlorodiphenyldichloroethylene (p,p'-DDE), heptachlor and heptachlor-epoxide, and heavy metals (cadmium, lead, mercury, copper and zinc) in 90 primary wing feathers of three raptor species: *Coragyps atratus*, *Cathartes aura* and *Polyborus plancus*. Feathers were collected during austral spring of 2011 in roosting and nesting areas from northwestern Patagonia, Argentina. We detected all OCs sought in the sampled feathers. The highest concentration and detection frequency was for the Endosulfan (90% of samples), one of the insecticides most commonly used in the country. A total ban of Endosulfan is scheduled for December 2015. We found metals in similar concentrations as reported for other species, however in some cases lead concentrations were higher than concentrations linked to toxicological effects. Results on both types of pollutants call special attention to the conservation of raptors in this part of the world.

Territories of Collared Forest-falcons (*Micrastur semitorquatus*) in a Mesoamerican Tropical Rain Forest

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Collared Forest-falcons depend on forest cover for nesting, feeding and breeding. Reduction of forest cover could influence the territory size if territory size increases when forest cover diminishes. This could occur if Collared Forest-falcons need to range in larger areas to meet their needs when habitat quality is reduced. We evaluated the territory size of Collared Forest-falcons in Los Tuxtlas Biosphere Reserve, in Mexico. We used the response of falcons to playback to estimate abundance, territory size and territory defense, while also mapping the spatial distribution of falcons in two areas with different percentage of forest cover. We found very low abundance of falcons overall (although similar abundance in both areas), and that territory size was larger in more fragmented areas (258 ha). Timing of defense of territories was different in the two areas we studied ($t = 5.2$, $gl = 38$, $p = 0.00007$). Our results suggest that forest fragmentation can influence territory size of Collared Forest-falcons, likely because they need to range over larger areas to breed and nest. Also, they may not be able to defend territories against conspecifics as strongly as Collared Forest-falcons in well-preserved areas.

Using GPS Tracking to Determine Foraging Selection Areas of Barn Owls (*Tyto alba*): A Preliminary Study



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Knowledge of foraging areas selected by the Barn Owls is most commonly based on incomplete information obtained using radio-telemetry and direct observation. GPS technology improves the efficiency and accuracy of documenting animal locations. The objectives of this study were to evaluate the use of a commercial CatTrack™ GPS device to track a Barn Owl and to test GPS tracking as a method for identifying selection patterns of foraging areas. To our knowledge, this was the first time a Barn Owl was tracked using GPS technology. Our study was conducted in an agroecosystem in the Argentinean Pampas. We removed a CatTrack™ device from its plastic frame and replaced its original battery with a 650 mA battery. We attached this 24.2g device to the back of an adult male in the breeding season by means of a nylon harness, and set it to record waypoints every 30 sec (if speed < 10km/h) and every 20 sec (if speed > 10km/h) between 7 pm and 6 am during June 2012. We recovered the device 20 days after attaching it. The device recorded during 8 running nights (12501 waypoints) prior to exhausting its battery. The recording frequency used resulted in a detailed track that allowed the identification of three different movement patterns. These were classified as perching (point patterns), hunting (meandering patterns) and transferring (linear patterns). We calculated Ivlev indexes of foraging area selection for the estimated home range (17.46 km² using the Minimum Convex Polygon method) by assigning one of these behavioral patterns to each recorded waypoint. Positive indices were obtained for vegetated areas (natural grasslands and pastures) and negative indices for areas with bare soil. These results are consistent with existing knowledge of foraging behavior in Barn Owls. The use of this technique represents an improvement for the behavioral study of this species.

Bringing Back the Burrowing Owl (*Athene cunicularia*) to British Columbia: A Story of Community Conservation

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The Burrowing Owl is a Species at Risk in Canada, and was extirpated from British Columbia in the 1980s. Burrowing Owl's natural habitats are the grasslands and deserts of North America. In Canada, populations of burrowing owls migrate in the fall to the southern United States and possibly Mexico. With a loss of native habitat, along with the decline in burrowing mammals and the effects of climate change, Burrowing Owl populations continue to decrease in Canada. Starting in 1990, volunteers initiated a comprehensive program for the re-introduction of captive bred owls to the wild, including captive breeding facilities, artificial burrow networks and field monitoring research. The Burrowing Owl Conservation Society, formed in 2000, now produces over 100 owls annually for release in the Nicola Valley and South Okanagan grasslands of British Columbia. Three breeding facilities are located separately across the province. A large volunteer team prepares artificial burrows on the private ranch and park land. Improved release techniques, including soft-release caging, has resulted in greater numbers of wild-born broods and offspring. With more owls produced, the numbers of owls returning to BC are gradually increasing each year. We are currently working internationally to follow and protect the owls on their migration route. Currently our best option for tracking the burrowing owl migration is to employ citizen science. We have confirmed sightings of owls across their migration route in Washington,



Oregon and California. Over the last 10 years we have strong indications of where owls breeding in British Columbia are overwintering. This method is currently a better solution for a non-profit organization to obtain information, compared to costly satellite transmitters and data loggers, which are hard to recover. The Burrowing Owl program in British Columbia is a prime example of an applied conservation project with strong community support.

First Description of Nesting of Chilean Hawks (*Accipiter chilensis*) in Valdivian Coastal Range, Chile

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From 2011–2012 we searched for evidence of nesting of Chilean Hawks in the Valdivian Coastal Range, Chile. We located two nesting sites: one within a commercial mature pine plantation and the other within an extensive remnant of second-growth evergreen forest. Both sites were located on rugged terrain with variable elevations (plantation = 80–100 m s.n.m, forest = 480–520 m s.n.m.), slopes of 20–30°, and presence of small ravines. Both sites were near roads (linear distance: plantation = 18 m, forest = 245 m), open areas (plantation = 127 m, forest = 250 m), and water courses (plantation = 46 m, forest = 30 m). Although both sites were close to rural residences (plantation = 127 m, forest = 500 m), they were relatively far from urban areas (plantation = 6 km, forest = 13 km). One active nest was found in each site, but an abandoned nest was also found at the forest site. Nests were built inside the crown of live trees (>15 m tall, 21–46 cm in dbh), 11–19 m above-ground and close to the main trunk. Platforms were firmly placed on forked branches and were relatively hidden from the ground. The two measured nests in the forest site were round-shaped platforms (length x width = 40 x 40 cm, and 45 x 34 cm) composed of strongly interlaced dry twigs and sticks. In general, the nesting site in the forest had similar characteristics to those studied in southern Argentina and other localities of Chile. Nesting in the pine plantation seems to have been promoted by the high availability of native prey, as a consequence of the abundant native vegetation under the canopy. Although preliminary, we think our results will contribute to better conservation planning for the Chilean Hawk in the coastal mountain range of southern Chile.

Endocranial Morphology of Birds of Prey and its Correlation with Their Life Strategies

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In order to find qualitative and quantitative features associated with different life strategies (e.g., food habit, moment of activity, etc.), 23 skulls of a diverse array of predatory birds from the families Falconidae, Accipitridae, Pandionidae, Cathartidae, Tytonidae and Strigidae were scanned using tomographies, and their endocasts were digitally generated. These three dimensional virtual structures reflect the volume and the external morphology of the brain due to the thinness of meninges in birds.



Diurnal raptors are characterized by a heart-shaped telencephalon in dorsal view (cranially tapered and caudally straight or notched) with a great lateral expansion, especially in *Geranoaetus* and *Harpyhaliaetus* (Accipitridae) species; relatively small wulsts although craniocaudally enlarged, separated by a well-marked fissura interhemisferica in *Pandion* (Pandionidae); and a relatively large cerebellum with developed auricula and reduced olfactory bulbs. Within diurnal raptors, active predators show large tectum mesencephali, with the largest in *Buteo*, *Accipiter* and *Falco*, while exhibiting a greater cranioventral development in *Pandion*. The scavengers *Neophron* (Accipitridae) and *Coragyps* (Cathartidae) have a cranially flat telencephalon that is strongly notched caudally with large olfactory bulbs. However, *Neophron* and *Coragyps* both share relatively small tectum mesencephali in a slightly cranial position with the opportunists *Milvago* and *Caracara* (Falconidae), and with the nocturnal raptors (Strigiformes). Nocturnal raptors are characterized by a proportionally large telencephalon, a weakly extended dorsocaudal cerebellum, and hypertrophied wulst, the latter feature possibly associated with stereoscopy. The volume of the endocast shows an allometric relationship with the body mass in all cases. However, the ratios of the wulst and tectum mesencephaly with respect to the telencephalon allow the distinction of diurnal raptors, scavengers and opportunists, and nocturnal birds of prey, just as the qualitative features do.

Green Space Within Home Ranges of Red-tailed Hawks (*Buteo jamaicensis*) in an Urban Environment

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In recent years there has been an increase in urban Red-Tailed Hawk populations, however, little is known about spatial relationships or habitat associations of these urban hawks. We investigated associations between individual hawk home ranges and the total amount and patch size distribution of green space within the home ranges. Data were obtained using VHF telemetry on eleven hawks in Hartford, CT during 2006–2011. ‘Green space’ was identified using a map layer obtained from the CT Department of Energy and Environmental Protection, and by digitizing aerial photographs. We found a weak negative association between home range size and proportion of green space, but no association between home range size and average patch size of green space. Approximately 87% of green space patches within hawk home ranges were less than 2 ha, raising questions about what constitutes ‘usable green space’ to an urban hawk. Maintaining green space in urban areas, particularly large patches, should help ensure continued success of urban Red-tailed Hawk populations.

Biomechanical Analysis of the Distal Hindlimb of Raptorial Birds (Accipitridae, Falconidae and Pandionidae): Force and Velocity in Equilibrium

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To establish the relationship of the tarsometatarsus and foot with capture techniques, the velocity ratio (Vr) was calculated for 26 taxa from the raptorial families Falconidae, Accipitridae and Pandionidae. The resultant force of the muscles involved in flexing the digits was estimated through physiological cross sectional areas (PCSA) for four species. Regarding the tarsometatarsus, the Accipitrinae and Polyborinae exhibited the highest values of Vr, whereas in *Herpetotheres cachinnans*, *Falco peregrinus* and *Pandion haliaetus* this ratio was lower, indicating a higher commitment with force. In general, digits I and III presented the highest Vr (higher speeds) and digits II and IV presented lower rates (higher forces). Digit I of *Caracara plancus*, *Spizapteryx circumcincta* and some Buteoninae (*Buteo erythronotus*, *Buteogallus urubitinga* and *Geranoaetus melanoleucus*) had relatively lower values of Vr. However, most of the Buteoninae and the Accipitrinae presented high values of Vr. For digit II, *Geranoospiza caerulecens* and the Falconidae had the highest values while the Buteoninae generally showed lower ratios. Digit III exhibited the lowest range of variability among all digits, and only *P. haliaetus* and *Busarellus nigricollis*, two piscivorous species, had a low Vr for this digit. Finally, digit IV had the lowest ratios among all digits. Interestingly, the PCSA results presented digit I exhibits the highest strength and digit IV the lowest, digit II and III presented intermediate force values, similar to each other. Therefore, there is a balance in the raptor distal hindlimb between speed and force: digits I and III act with higher speed first and then with force latter to retain the prey, and digit II always acts with force after the first digits, assuring retention of the prey.

Why the Smaller-bodied Striped Owl (*Asio clamator*) Captures Larger Prey than the Comparatively Larger-bodied Stygian Owl (*Asio stygius*)?

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Simultaneous studies on the diet of syntopic Striped and Stygian Owls at the reserve of Universidad Federal de São Carlos in southeast Brazil revealed birds and mammals were the staple food of these nocturnal raptors, both by numbers and biomass. However, the larger Stygian Owl (495–675 g body mass) consistently captured smaller vertebrate prey than the smaller Striped Owl (341–553 g); mean \pm SE: prey mass 20.9 ± 0.6 (n = 1728) for Stygian Owl and 35.6 ± 2.8 g (n = 242) for Striped Owl ($t = -7.6$; $p < 0.001$). As both raptors are nocturnal, hunt solitarily, and use similar open to semi-open habitats during their foraging activities, presumably some morphological traits (e.g., disproportionally large talons of the Striped Owl) could explain this “reversal” discrepancy in prey size. I conducted a series of morphological measurements on museum specimens of these two species of owls, including talon size and extension, bill length, width and depth, and wing and tarsus length. Only two morphological traits analyzed were significantly larger in Striped Owl than in Stygian Owl, even though the latter is the larger-bodied species: talon extension (including digits I and III) and beak width at base. These traits are directly related to capture, kill, and ingestion of prey. Thus, at least partially, the comparatively larger talon extension and beak width of the Striped Owl explain why this smaller-bodied owl can capture and ingest larger vertebrate prey than the larger-bodied Stygian Owl. Additional studies to complement the possible causes for the prey size patterns observed should stress a comparison of prey handling behaviour from both species, a topic virtually absent in the literature.



Predation on Disease Transmitting Rodents by the Barn Owl (*Tyto alba*) in the Foothills of the Metropolitan Region of Chile

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From 2008–2009, we studied predation pressure on disease-transmitting rodents by the Barn Owl in Cantalao, an Andean locality near Santiago, Chile. We analyzed pellets to ($n = 142$) and prey remains ($n = 31$) to study Barn Owl diet. We identified 199 prey items, with small mammals accounting for 85% of the total individual prey items. Birds and insects accounted for a small fraction of the prey spectrum (13% and 2%, respectively). Among small mammals, we identified seven rodent species: *Phyllotis darwini* (17.1%), *Abrothrix longipilis* (9%), *A. olivaceus* (8.5%), *Abrocoma benetti* (6.5%), *Rattus rattus* (4.5%), *Oligoryzomys longicaudatus* (4.5%), and *Octodon degus* (1.5%). *Thylamys elegans* (7.5%) was the only marsupial identified. Small mammals were the core of the diet during all seasons (winter = 73%, fall = 74%, spring = 84%, summer = 90%). Consumption of rodents that potentially harbor hantavirus (*O. longicaudatus*) and leptospirosis (*A. longipilis*, *A. olivaceus*, *O. longicaudatus*) was relatively low (0.5–13% of all individual prey), which could be explained by their low availability in the field. Overall, the Barn Owl's diet in Cantalao was very similar to that described in previous studies in Chile.

Relative Densities of Golden Eagles across the Western United States during Late Summer

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Since 2006, Western EcoSystems Technology, Inc. (WEST) has conducted late-summer Golden Eagle (*Aquila chrysaetos*) surveys for the United States (U.S.) Fish and Wildlife Service across the western U.S. During these surveys, observers in fixed-wing aircraft recorded observations of Golden Eagles along 17,500 km of transects within four Bird Conservation Regions covering 1,962,909 km², an area two-thirds the size of Argentina. Observations of Golden Eagles within 1000 m of each transect have been used for annual estimates of Golden Eagle population sizes, but our goal here was to use the observations to develop a large-scale habitat use model describing relative Golden Eagle densities across the study area. We sub-sampled transects flown into 10 km segments and modeled the total number of Golden Eagles observed within each segment as a function of large-scale habitat characteristics using Negative Binomial regression, accounting for probability of detection. The final habitat use model estimates relative densities of resident and non-resident Golden Eagles during late-summer, using predictor variables such as elevation and solar radiation, various vegetation characteristics, and a measure of wind potential from a model developed by the National Renewable Energy Laboratory.



Model validation was used to evaluate the predictive ability of the final model, and a predictive map of relative Golden Eagle density for the entire study area. The Golden Eagle density map is the first of its kind due to its grand scale, which can be used to identify regions of higher concern for Golden Eagle conservation and management.

Occupancy Rate and Breeding Success of American Kestrels in a Nest-Box Population in Central Argentina

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In recent decades, intensification of agricultural processes has caused strong environmental changes. This has negatively affected many species, including birds of prey. To analyze these effects in a population of American Kestrels (*Falco sparverius*) in La Pampa, Central Argentina, we placed nest boxes in three different areas: 1) a natural Caldén forest (*Prosopis caldenia*; twenty four boxes remnant of fifty placed in 1998), a traditional farming area (forty nine boxes placed in 2011), an intensive farming area (thirty boxes placed in 2012). Here we present preliminary data on occupancy rates and breeding success. Occupancy rates were very high in agricultural areas (65% in 2011-12 and above 80 % in 2012-13) contrasting with a long-lasting low occupation rate in the forest area (lower than 25 %). The mean laying date was within the last week of October in both years although it was a week earlier in 2012-13 for the areas one and two. In the second season, laying date was significantly later in area three where the boxes were ready a week later. Clutch size was similar in the three areas and the two years (mean around 4.25). The proportion of pairs breeding successfully tended to be lower in 2012-13 although not significantly. The number of fledglings per breeding pair was significantly lower in 2012-13, whether including area three in the analysis or not. Besides laying date, no differences were found among the three areas, although more accurate estimation of habitat characteristics around each box would be desirable for robust conclusions. The extremely high occupancy rates and good reproductive values confirm that Argentinean agricultural lands provide excellent habitat for the American Kestrel.

Solitary Crowned Eagles' (*Harpyhalieetus coronatus*) Plasma Neutralizes Pit Viper (*Bothrops alternatus*) Venom In Vitro

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Ophiophagy ("snake eating") is a type of alimentary behavior characterized by the hunting and consumption of snakes. Some ophiophagus ("snake eaters") animals have plasmatic proteins which can confer immunity to snake venom. The Solitary Crowned Eagle, an endangered raptor inhabiting



Argentina, Bolivia, Paraguay and Brazil, is known to occasionally feed upon several species of venomous snakes, suggesting the presence of effective anti-venom protective mechanisms in their plasma. However, the anti-venom activity of the Eagle's plasma has not been reported. We hypothesize that Solitary Crowned Eagle's blood have anti-venom protective factors. Therefore, in this presentation, we report the results of a series of assays investigating the neutralizing activity of the Eagle's plasma against the hemolytic, coagulant, and hemorrhagic effects of pit viper's venom. Preliminary results of this study suggest that the Eagle's plasma has a series of components capable of neutralizing different toxic fractions of pit viper's venom by inhibiting in vitro several enzymes and toxins in a dose-dependent form. Combined with mechanical barriers on the Eagle's leg skin and discrete hunting behavior, the presence of anti-venom neutralizing fractions in their plasma may confer the Solitary Crowned Eagle with an ecological advantage that may allow them to feed safely on venomous snakes. Further research is ongoing to isolate and characterize the specific protein fractions present in the Solitary Crowned Eagle's plasma responsible for neutralizing snake venom.

Helminthes Parasites from Gastrointestinal Tract of Chimango Caracara (*Milvago chimango temucoensis*) (Aves, Falconidae) from Región de Los Ríos, Chile

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The Chimango Caracara is a bird of prey distributed throughout Chile, including a subspecies most frequently found in southern Chile. Chimango Caracaras have diverse diets, which may include earthworms, reptiles, amphibians, fish, birds and carrion. This wide spectrum of prey makes Chimango Caracaras a very interesting species from a parasitic disease perspective. Consumption of a diversity of prey potentially allows the biological lifecycles of parasitic helminthes that infect carnivorous birds to be fulfilled. Part of the objectives of our study were to confirm the parasitic fauna described by *Martín et al.* (2006), and if possible, to identify new helminthes from this species of Caracara in southern Chile. Of the 14 caracara specimens studied, 11 were positive for parasites. We found 1298 helminths in the gastrointestinal tract of the specimens studied, of which 1292 were nematodes, four were acanthocephalans, and two of them were trematodes. Within the nematodes found, 1230 were *Capillaria* species, with at least three different species from the genus: *C. tenuissima*, *C. obsignata*, and *C. anatis*. We also identified 42 *Porrocaecum* species, seven *Procyrnea* species, 10 *Synhimantus* species, one *Cosmocephalus* species and two *Skrjabinoclava* species, with the latter being only the second published report of the species parasitizing a raptor. The acanthocephalans belonged to the genus *Polymorphus* species, and the trematodes belonged to the genus *Lyperosomum* species. The specimens of *Synhimantus* species, *Cosmocephalus* species, *Skrjabinoclava* species, *Polymorphus* species, and *Lyperosomum* species were also the first report for each species in Chile. The report of *Lyperosomum* species was the first record of this parasite in a bird of prey. Finally, we also found injuries caused by helminths, including swollen and ulcerated areas *in situ* in the proventriculus and gizzard mucosa of two birds.

From the Arctic to the Neotropics: Summer and Winter Home Ranges of the Arctic Peregrine Falcon (*Falco peregrinus tundrius*) and the Migration Routes Between Them



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Arctic Peregrine Falcons – a subspecies that breeds in the Arctic regions of Canada, the U.S.A., and Greenland – exhibit vast migrations to wintering grounds in the Neotropics as far south as Chili. Although knowledge of the foraging ecology and behavior of Arctic Peregrines on their northern breeding grounds is accumulating, little is known about the ecological requirements of these birds on their Neotropical wintering grounds. As a first step to fill this knowledge gap, we equipped 15 male and 10 female Peregrine Falcons with solar powered Platform Transmitting Terminals (PTTs) on their breeding grounds in the Eastern Canadian Arctic (Nunavut) to compare summer and winter home ranges and determine the migration routes between them. By describing winter home ranges we can recommend where future studies of Arctic Peregrine Falcons wintering in the Neotropics should be located and identify patterns of winter habitat use. In addition, identifying key migration routes between summer and winter home ranges will provide a complete picture of the year-round requirements of this long-distance migrant. Migration routes through North America were variable ranging from the eastern coast to the eastern foothills of the Front Range of the Southern Rocky Mountains in Colorado. Migration routes into and out of the Neotropics either hugged the gulf coast, crossed directly over the Gulf of Mexico, or followed the Florida Peninsula to Cuba and the Dominican Republic before crossing the Caribbean Sea. Peregrines wintered in 9 different countries: the Bahamas, Cuba, Mexico, Columbia, Venezuela, Ecuador, Peru, French Guiana, and Brazil. A more thorough description of the habitat types within winter home ranges based on satellite imagery and existing broad-scale habitat classification systems will be presented in the poster, with a focus on patterns observed across individuals.

Current Conservation Status of the Andean Condor (*Vultur gryphus*) in Colombia

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The historical distribution of Andean Condors in Colombia included much of the Andean region. By the end of Twentieth Century, the species was locally extinct in most of their original geographic range due to threats such as illegal hunting, reduction of the wild mammal prey base, competition with introduced species like dogs, accidental poisoning and collisions with power lines. To recover the species, a repopulation process began in 1989 in seven sites within the species historical range. To date 71 Andean Condors have been released. Through occasional sightings, secondary information review and interviews with community members, we have arrived at a good estimate of the current population. The disposition of the 71 released condors includes the survival of 40 condors, the death of 11 individuals (mainly due to hunting, poisoning and collisions with power lines) and the probable migration of five condors to the Ecuadorian paramos. Fifteen individuals have not been observed in the last six years and are unaccounted for. Adult and young native Andean Condors were sighted recently at five of the release sites. These records of native condors, added to the surviving released individuals and assuming



the presence of the 32 Andean Condors recorded by Humboldt Institute and Bioandina in 1999 in Sierra Nevada de Santa Marta, brings the species population in Colombia to at least 90 individuals. In order to assess the actual conservation status of the Andean Condor in Colombia and the effectiveness of the management actions, current and systematic counts and population analysis are still needed.

Preliminary Results About the Satellite Tracking of a Pair of Andean Condors (*Vultur gryphus*) Recently Released in Colombia

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During the 1980s, the Andean Condor population in Colombia declined precipitously to less than 200 individuals, and their distribution became restricted to just two small regions within their original geographic range: Nariño and Sierra Nevada de Santa Marta. Over the previous 20 years, an intensive reintroduction program has released 71 condors to their former range. The latest Andean Condor release in February 2013 introduced a pair (male and female) to páramo El Mosco (Boyacá - Colombia) near El Cocuy Natural National Park. Each individual condor was fitted with a Telemetry Solutions Quantum 4000 enhanced solar-powered GPS patagial tag satellite transmitter. We detected differences in the home ranges and movement patterns of the two tracked condors after three months. The female bird made larger movements to date, with a home range of 37 539 Ha compared to the 1905 Ha of the male. The female condor has also traveled furthest from the release site, during flights ranging from 2.0 to 30.0 km, while the male has displayed more constant movements ranging from 2.5 to 4.0 km closer to the release point. Maximum daily displacements of the tracked female reached 80 km while the male reached only 16 km. This pair comprises the first Andean Condors to be GPS tracked in Colombia. Information from our study will be used to better understand the habitat use and spatial behaviors of the species and to inform conservation management efforts to restore condor populations in the region.

Are Infectious Diseases and Environmental Toxins Decreasing Raptor Populations in Southern California?

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Southern California raptor populations appear to be steadily declining over the past 20 years. While recent drought, habitat destruction, and anthropogenic causes can partially explain this decline, the role of environmental toxins and infectious agents have not been fully investigated. We hypothesize that southern California raptors may be exposed to second-generation anticoagulant rodenticides (SGARs), lead, and select avian pathogens. The main goal of this preliminary study was to investigate the



prevalence of exposure to SGARs, lead, West Nile virus, Avian Influenza virus, *Trichomonas* species, hemoparasites and *Toxoplasma* species in nestling raptors of southern California. A total of 96 nestlings from five species of raptors (barn owl *Tyto alba*, white-tailed kite *Elanus leucurus*, red-shouldered hawk *Buteo lineatus*, red-tailed hawk *Buteo jamaicensis*, and Cooper's hawk *Accipiter cooperii*) were investigated. Results indicate that in 2011 and 2012 nestlings were not likely exposed to Avian Influenza and lead (overall prevalence of exposure was 0%) and mildly exposed to *Toxoplasma* species (1%), West Nile virus (1%) and SGARs (7%). However, the southern California population of raptors appear to be experiencing an endemic of hemoparasite (overall prevalence of *Leucocytozoon* species, a potential avian pathogen, was 37.7% for 2011 and 42.1% for 2012) and, in the case of Cooper's hawks, *Trichomonas* species infections (prevalence of infection 55%). Variation in prevalence and potential impact of these pathogens and environmental toxins among raptor species seems to be determined by feeding habits, geographic distribution and other ecoepidemiological variables. The role these avian pathogens play in the population decline will require further investigation in more raptor species by a larger sample size and the inclusion of immature and adult birds.

Raptors in Vegetated Valleys of the Atacama Desert in Northern Chile

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We studied the relationship between raptor distribution and landscape characteristics in five vegetated valleys in the Atacama Desert of Northern Chile. These valleys are surrounded by an extensive region with minimal biological activity, obtaining their water from the high Andes. Because most of the study area is dominated by agriculture, native vegetation is restricted to a few scattered patches. We conducted bird censuses during the spring (October) from 2006 through 2012. In 2006 and 2007, we conducted censuses only in the Azapa and Vitor valleys. In 2008 we added the Camarones, Camiña and Lluta valleys. We based bird censuses on fixed-radius point-counts. In total, we positioned 208 sampling stations. Habitat features, such as the percentage cover of native vegetation, agriculture, bare soil, human construction, and water were recorded at every station. In total, we detected 11 raptor species in all valleys during all study periods. Four species (*Falco sparverius*, *Cathartes aura*, *Glaucidium peruanum* and *Geranoaetus melanoleucus*) were the most numerous and only *F. sparverius* and *G. peruanum* were detected in all valleys. A Kruskal-Wallis test showed that most habitat features differed significantly between valleys ($p < 0.01$) and that raptor richness varied accordingly. Our results indicate that raptor species respond to landscape structure in the study area.

Reverse Size Dimorphism in Neotropical Owls



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Male of birds of prey are usually smaller than females of the same species, a kind of dimorphism that is often called “Reverse Size Dimorphism” (RSD) as it opposes the more common trend in endothermic vertebrates where males are larger. As there are few studies about RSD in neotropical Owls, this study aims to quantify RSD in the owl species of Brazil. We measured specimens in the collections of the Instituto de Biologia – UFRJ, Museu Nacional - RJ, Museu de História Natural Capão da Imbuia, Instituto de Biociências – USP, and Museu de Zoologia da Universidade de São Paulo. We documented three measurements from each specimen. We recorded weight and total length from specimen labels, collection catalogs, or fresh specimens, and wing length from taxidermy specimens. Although we gathered data from 18 species, only eight were of sufficient sample size (approximately at least five males and five females for each measurement) to provide reliable RSD estimates. We calculated an index of dimorphism for each measurement, using the formula provided by Storer (Auk, 1966, 423-436). We reduced these indices to a single latent variable by using a principal component analysis. As a general pattern, RSD was confirmed, except total and wing length in *Asio clamator* and total length in *Athene cunicularia*, where direct dimorphism was observed. Despite different values between indices, weight was always the most dimorphic trait followed by total length or wing length. These measures were often coherent in a manner that the most dimorphic species in one trait tended to be also the most dimorphic in the other two measures. In ascending order of RSD, the species studied were *Asio clamator*, *Athene cunicularia*, *Pulsatrix koeniswaldiana*, *Strix virgata*, *Glaucidium brasilianum*, *Megascops choliba* and *Strix hylophila*.

Predation on *Oxymycterus judex* (Mammalia: Cricetidae) by *Parabuteo leucorrhous* (Aves: Accipitridae) in Florestal Gateados, Campo Belo do Sul, SC, Brazil

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Small mammals, such as *Oxymycterus judex*, a large fossorial rodent that inhabits southern Brazil, are an important source of energy for birds of prey. *Parabuteo leucorrhous* is a neotropical forest hawk species with a little known diet. I observed predation of *O. judex* by *P. leucorrhous* between the conservation area Emílio Einsfeld Filho (RPPN) and the Forest Gateados, in Campo Belo do Sul, SC. During my observation at 1100 hr on 17 June 2011, I saw an individual of *P. leucorrhous* hunting in Forest Gateados. At 1310 H the hawk landed in a *Eucalyptus* in Forest Gateados. When I approached, the hawk moved to another *Eucalyptus* branch, and began tail flicking. While doing so, it noticed a potential prey item and attacked, always tail flicking throughout. I heard the impact of the hawk striking the rodent, then the hawk left the bushes and flew very low along a road. The hawk hid in a shrub after 200 m of flight. Prior to my approach, the hawk abandoned the *O. judex* it had captured. The rodent was bleeding from the mouth and from holes in the belly near the forelimbs. It was a male, weighed 90 g, was 283 mm from snout to tail, and was subsequently deposited in the scientific collection of mammals at the Federal University of Santa Catarina, as UFSC-4673. *P. leucorrhous* weigh between 290-389 g, so these data suggests it can capture prey at least as much as 23-31% of its body mass. Future research should



continue the study and monitoring of *P. leucorrhous*, and to attempt to capture individuals for telemetry.

Short to Long-distance Dispersal Movements of Chimango Caracaras (*Milvago chimango*) Revealed by Band Recovery and Resighting Data

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Dispersal movements are a key aspect in animal ecology due to their potential to regulate population dynamics, but are one of the least studied topics in avian biology in general and in Neotropical raptors in particular. Bird banding is an important tool used to understand dispersal movements. The Chimango Caracara is one of the most common birds of prey in South America, but little is known about the movements of adult and juveniles of this species. We examined patterns of dispersal movements of Chimango Caracaras based on band recovery, and on recapture and resighting of previously marked birds. We banded 694 adults and 676 nestling and juvenile Chimango Caracaras at three sites in La Pampa province. Of these 270 were recaptured and 128 were resighted. A total of 23 individuals banded as nestlings or fledglings were recaptured or resighted as reproductive adults in following reproductive seasons. Of these, 78.3% (18 birds) bred in the same site where originated, and 21.7% (five birds) bred at different sites. An adult male of this last group was resighted in an urban area of San Carlos de Bariloche (Neuquen province, Argentina, 785 km from its natal site), while the remaining three females and one male dispersed about 10 km from their natal territories. Our results indicate that although the bulk of the population of Chimango Caracaras are phylopatric, some individuals perform moderate to long distance dispersal movements. These results have important implications not only for the species' spatial ecology and demography but also for taxonomy, population genetics and gene flow because birds from Patagonia have been considered a distinct sub-species from those of central Argentina.

The East to West Migration of Steppe Eagle (*Aquila nipalensis*) and Other Raptors in Nepal, Autumn 2012

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We studied migration of Steppe Eagles and other raptors in the foothills of the Himalayan Mountains, just south of the Annapurna Range. We conducted observations during 81 days, between 15 September and 04 December 2012. We counted migrants from 0900 to 1800. We identified 30 migrant raptor species including 10 species of Eagles, four species of Vultures, six species of Falcons, three species of *Buteos*, two species of *Accipiters*, two species of Harriers, Osprey (*Pandionhaliaetus*), Oriental Honey-buzzard (*Pernis ptilorhyncus*) and Black-eared Kite (*Milvuslineatus*). We also observed nine resident (non-migratory) raptor species. Season totals included almost 10,000 individuals. These migrants were heading east to west from China and Mongolia through Nepal to India, with some presumably



continuing to the Middle East and Africa. Steppe Eagles were most numerous, totaling 6,597 individuals. The highest daily count was 572 birds on 3 November. We aged approximately 60% of Steppe Eagles; among them we identified 697 Juveniles (1st plumage), 1,328 Sub-adults (2nd – 4th Plumage), and 1,931 adults (\geq 5th plumage). At our watch site, the migration of Steppe Eagles occurred from 0800 to 1700, with peak numbers counted between 1400 and 1500. The best time to see the most migrant raptor species in one day was early November, but different species peaked at different times.. For example, in 2012 the Amur Falcon (*Falco amurensis*) and Lesser Kestrel (*Falco naumanni*) migration peaked from approximately 20 October through 5 November; Oriental Honey-buzzard peaked from 25 to 31 October; and Himalayan Vulture (*Gyps himalayensis*) peaked from 10 to 20 November. The largest movement of Steppe Eagles occurred in early to mid-November. Even in late November, Steppe Eagle migration was strong (up to 300/d), and species such as Himalayan Vulture, Griffon Vulture (*Gyps fulvus*), and Cinereous Vulture (*Aegypius monachus*) regularly moved east to west into early December.

City Slickers: Conservation Related Conflicts in the Nest Site Selection of an Urban Breeding Raptor and the Distribution of its Avian Prey

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The urban space is a permanently changing ecosystem, generally decreasing in biodiversity, but providing new anthropogenic habitats for adaptable species. Among raptors, such an adaptable species is the Eurasian Kestrel (*Falco tinnunculus*). In Europe, dense urban populations of Eurasian Kestrels are ethologically different from rural populations. Several studies indicate that urban kestrels increasingly feed on birds, and birds were the kestrel's main prey in one study. We analyzed nest-site characteristics, diet choice and breeding success of urban kestrels in Vienna, Austria, as well as the abundance of avian prey in different urban habitat types. Our comparison of nest-sites with random buildings indicated urban kestrels depend on the accessibility of niche structures on historical buildings, and favored nest-sites in the vicinity of green backyards. Between 2010 and 2012 all breeding parameters except the egg-laying date significantly decreased between the city center and the periphery. We found larger clutches and higher fledging-rate at buildings with green backyards and in the vicinity of city parks. We found comparable accumulations of prey-sized bird species in green backyards, parks and surrounding suburban areas. The biomass of prey-sized birds in spring was generally lower than the density in summer, indicating a high availability during the kestrel's breeding season. We thus hypothesize that Eurasian Kestrels use their immediate surroundings to hunt, but are not as efficient in hunting avian prey as they are hunting voles. Changes in modern city architecture and replacement of historical buildings pose conservation related conflicts for predator and prey.

Austral Pygmy-Owls (*Glaucidium nanum*) and the Bird Community in Forest Landscapes: Preliminary Results



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Temperate forests of southern Chile harbor few species of birds of prey, but do support Austral Pygmy-Owls. This little owl is distributed throughout most of the southern cone of South America, across a range of habitats from deserts to cold Nothofagus forests. Given the wide range of habitats Austral Pygmy-Owls occupy, we asked whether its abundance and diurnal activity are influenced by the community of birds that might be part of its prey. We surveyed bird populations through intensive mist-netting in forest landscapes of South-central Chile. As suspected, we found the abundance of Austral Pygmy-Owls was strongly correlated with the abundance of other forest bird species ($F = 9.4$; $df = 4, 14$; $P = 0.0006$; $R^2 = 0.73$). Austral Pigmy-Owls showed a positive and significant relationship with the occurrence Green-backed Firecrests (*Sephanoides sephaniodes*) and Black-chinned Siskins (*Spinus barbatus*), ($P < 0.001$) and ($P = 0.016$), respectively. At the same time, Austral Pigmy-Owls showed a negative relationship with the abundance of two secondary cavity nesters, Thorn-tailed Rayaditos (*Aphrastura spinicauda*) and Southern House Wrens (*Troglodytes musculus*), but only for the wren it showed a significant effect, ($P = 0.049$). Our results suggest that Austral Pigmy-Owls prefer forest sites where the abundance of generalist bird species is greater. We speculate that these high-mobility species might be targeted by Austral Pygmy-Owls during their stopovers within the forest. It also seems that Austral Pygmy-Owls avoid areas occupied by Thorn-tailed Rayaditos and Southern House Wrens, suggesting that avoidance could occur in response to alert calls and aggressive responses that could diminish hunting success.

Crowned Solitary Eagle (*Harpyhaliaetus coronatus*) Medical Management for Rehabilitation in Argentina

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The globally endangered Crowned Solitary Eagle is the most threatened eagle in the Neotropical Region. According to the Action Plan for the Conservation of the Crowned Solitary Eagle in Argentina, information regarding health status of captive and free ranging populations is insufficient. The aim of this work is to communicate basic clinical diagnosis, medical management and results obtained during the last ten years of Crowned Solitary Eagles rehabilitation. Medical records of 15 individuals assisted by PCRAR-Buenos Aires Zoo were consulted. The initial health-check for patient admittance included general anesthesia with inhaled Isoflurane in 14/15 cases. Main clinical findings consisted of deteriorated body condition (dehydration and low body score) 15/15, trauma 6/15 (including leg amputations, gunshots and bone fractures), dyspnea 1/15 and neurologic injury 1/15. All birds received fluid replacement therapy during the first 72 hr of the quarantine and X-ray examination. Six of 15 individuals received Itraconazol for at least 21 days as a preventive anti-fungal treatment with no side effects. The dyspneic bird was diagnosed by X-ray with aerosacculitis and treated with Itraconazol and Amocicilin-clavulanic acid over 21 days with a good clinical recovery. The bird with neurological signs (opisthotonos) also presented ventricular arrhythmia and responded positively to thiamine supplementation over 15 days. Long bone fractures (ulna and radius in two cases, tibiotarsus in one



case) were resolved by surgery after initial patient stabilization using internal-external fixation techniques. General anesthesia for orthopedic surgery was accomplished through inhaled and regional anesthesia (assisted by neurolocalization techniques) in two of three cases, reducing general anesthetic time and obtaining a faster patient recovery. Analgesic protocols including NSAIDs, opioids and nervous plexus blockage, presented better responses whit multimodal approaches. Producing relevant records on *H. coronatus* medical management, will help setting solid bases to effectively manage captive populations and improving national rehabilitation networks.

Owls in Monterrey Pine (*Pinus radiata*) Plantations in South-Central Chile

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Monterey pine plantations are the dominant vegetation in the Coastal Range of South-Central Chile, where deciduous Southern Beech (*Nothofagus spp*) forests are native. Although pine plantations are intensively managed, there is growing evidence that they are host to a significant proportion of the original plant and animal biotas. One of the least known groups in these industrial forests are raptors, particularly owls. Using call-playback we assessed the use of Monterey pine plantations by different owl species in 28 sites in the Maule and Biobio Regions. We selected plantations of different ages (1-2, 4-5 and 17-20 y, n=10, 8, 10 respectively). We used the recordings of four species whose known range included the study areas: the Austral Pigmy Owl (*Glaucidium nanum*), Rufous-legged Owl (*Strix rufipes*), Magellanic Owl (*Bubo magellanicus*) and Barn Owl (*Tyto alba*). Because in most sites there were native forest patches in the vicinity, we only analyzed responses clearly coming from individuals inside the plantations. The Austral Pigmy Owl was recorded in 29% (8/28) of study stands, whereas the Rufous-legged Owl had the highest total number of (unequivocally identified) individuals (12) with two sites in which three different individuals were recorded at the same time. This species was the only one whose abundance showed a clear relationship with plantation development, with numbers of records being positively related to stand age (GLM Poisson, $p < 0.05$). The Barn Owl showed the opposite trend, but the relationship was not significant (GLM Poisson, $p < 0.13$). The Austral Pigmy Owl showed no apparent association to stand age (GLM Poisson, $p < 0.13$). Our results show that Monterey pine plantation in Chile are habitat to most native owl species and confirm previous observations that the forest specialist Rufous-legged Owl has successfully adapted to this novel environment.

Bypassing or Accumulation? Impact of Regional Weather Conditions on Migration of Raptors at the Batumi Bottleneck, Republic of Georgia

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Long-distance migration by raptors is mostly completed by soaring flight utilizing the energy of vertical winds in atmospheric updrafts to reduce their energy consumption. Geographical restrictions along the migration route, social behavior and the availability of thermal convections are the main drivers for high agglomerations of raptors at convergence zones worldwide. Such areas are important for conservation and research as they often represent large proportions of raptor populations. In this study we describe spatial flight strategies of soaring migrants in respect to weather influences on a regional scale at the eastern Black Sea route in Georgia, Eurasia's largest bottleneck for autumn raptor migration. In a Poisson-regression process with over-dispersion, we modeled the abundances of eight species to test influences of selected weather parameters. We hypothesized that birds accumulate at poor regional weather conditions or circumvent them when favorable conditions occur on an alternative route. We found high accumulation of soaring migrants when cloud cover over 50% dominated the study region. Other factors such as rain or difference in minimum and maximum temperature behaved as blocking factors or enhancing factors, respectively. We did not detect circumvention of areas of poor weather for soaring or non-soaring migrants, but instead observed accumulation due to poor weather. We discuss agglomeration and alternatives for trans-regional circumvention as well as the benefit of modeled parameters. In conclusion, one can say that the results encourage activities of the local survey team (batumiraptorcount.org). Multiple-site monitoring enabled documentation of a very large proportion of the species of interest and variation in the count data were minimized.

Lead Exposure in South American Vultures: A Regional Threat for the Andean Condor (*Vultur gryphus*)?

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Lead poisoning brought California Condors (*Gymnogyps californianus*) to near extinction, and remains a serious conservation threat for many birds of prey. Reports of lead susceptibility in Andean Condors is isolated to date, but may indicate a larger problem. Our aim was to determine if lead poisoning is a geographically local threat or a regional problem for Andean Condors. We searched for scientific papers, technical reports and popular publications to document lead exposure events in Andean Condor across South-America. We evaluated lead levels from blood, feathers, bone and other tissues, and documented lead pellets found in dead condors' digestive tracts. Our data indicate exposure events are occurring in Argentina, Chile and Ecuador. The most detailed studies come from Argentina, where lead levels above background or lead poisoning events have been found in all provinces throughout the species' range. In southern Chile there is at least one documented case of a lead poisoned condor. In Ecuador, a group of captive condors originally admitted for rehabilitation presented mean blood lead values up to twice background level. Considering the large evidence of lead exposure in Argentina and that many condors cross between Argentina, Chile and Bolivia, we assume lead exposure documented in Argentina might be similar in Chile and in adjacent countries. The border between Argentina and Chile represents almost sixty percent of tcondor habitat in the Andes Mountains. That evidence together with exposure events



in northern latitudes from Ecuador, indicate lead poisoning is a regional problem for condors throughout their range. Including data from other countries across the species' distribution will improve this diagnostic. However, it is clear that lead exposure is an extended problem that may be a key factor in the survival of condors and other scavengers.

Colonisation of Polesie Region (Eastern Europe) by Great Grey Owl *Strix nebulosa*.

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The Polesie Region population of Great Grey Owls is isolated 400-500 km south of the species' primary northern Europe range. The first known breeding record for Great Grey Owls in the Polesie Region was in Belarus in 1843. Breeding birds were also documented in the Belarusian part of the Białowieża Forest in 1929-1930. By the end of Second World War, the Great Grey Owl was extremely rare in Polesie, in spite of the fact that the population had started to increase in range and numbers prior to the conflict. The population is now expanding again. Great Grey Owls have been expanding towards the border of Ukrainian Polesie, where in 1985 the first brood was found in the region. In the 1990s, the Belarusian population was estimated at 50-100 breeding pairs, and was thought to be increasing. In Ukraine, at the same time, about 20 nesting territories were known. After the millennium, Great Grey Owls expanded south-westwards into Belarus and approached the Polish Polesie boundary. In the Ukraine, nests located 290 km from the Polesie compact range were found. In 2010, owls started breeding in Polish Polesie, when two breeding pairs were found in Sobibor Forest, and by 2012 there were eight breeding pairs. In 2013 we found 6 nests in Poland and a few territorial pairs. Currently, the Belarusian population is estimated at 100-250 pairs, and the Ukrainian population is estimated at 60-110 pairs. Great Grey Owls in the Polesie region seem to be a nomadic, not staying in one territory for the duration of life, but moving instead in response to fluctuations in rodent populations, particularly in the Sobibor Forest, and depending on availability of nests of large raptor species when occupying new areas.

The Current Situation of Raptors in Asia and Activities of the Asian Raptor Research and Conservation Network (ARRCN)

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For reasons of geography and climate, Asia supports some of the most abundant raptor diversity in the world. This includes 125 species, with endemic species such as the Indian Black Eagle (*Ictinaetus malayensis*), the Crested Serpent Eagle (*Spilornis perplexus*), and the Grey-faced Buzzard (*Butastur indicus*). Variation in subspecies also is very high due to species' distribution on many different islands, and due to the wide variety of habitat types available, i.e., *Nisaetus* Hawk-eagles inhabit dense forest. In



Asia, 55 raptor species are migratory, with some or all individuals crossing national borders. Despite this diversity, a large number of raptors, especially those which live in tropical forests, are becoming endangered due to development and destruction of tropical forests. Illegal poaching also occurs in many parts of South-East Asia. Unfortunately, little information about the distribution and ecology of many raptor species in Asia was known prior to 1999, when the ARRCN was established to promote research and conservation of raptors. The purposes of ARRCN are to exchange information concerning raptors among members, to compile a database about raptors, to practice collaborative research projects, to cultivate raptor researchers, and to educate the public. So far, 7 biannual Symposiums have been held in 7 countries. Collaborative research projects including raptor migration, ecology of raptors whose habitats are limited in Asia or whose distribution is spread in Asia beyond countries, and so on, have been conducted. Consequently, we can initiate raptor research and conservation activities in several Asian countries and establish a network among raptor researchers and people who are working for nature conservation. We plan to secure members in all Asian countries, to promote and expand collaborative research projects, to complete a data base of all Asian raptors, to establish conservation strategies, and to strengthen relationships with other conservation organizations.

Raptors of Southeastern South American Grasslands: Effects of Landscape Features on the Assemblage Composition and Species Distribution

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Raptor distribution is related to habitat availability and heterogeneity, and land use changes can affect assemblage compositions. We surveyed raptors in the grasslands of southern Brazil and Uruguay aiming to examine the assemblage composition and investigate its relation with topographic and habitat features. A total of 44 roadside point transects, surveyed four times each (a total of 176 transects), yielded 9609 observations of 30 species of raptors. Species richness decreased in a northeastern-to-southwestern gradient, possibly related to a decrease in habitat heterogeneity. Raptor distribution and assemblage composition were related to altitude and habitat availability, and four assemblages could be identified in southeastern South American grasslands. Raptor assemblages at altitudinal grasslands in the Araucarian Moist Forest ecoregion had higher abundances of forest raptors than the other regions. Three assemblages were distinguished in the Uruguayan Savanna ecoregion: 1) the south Brazilian coastal plain, had species related to wetlands and human-modified habitats; 2) the Serra do Sudeste grassland, had a mix of forest and grassland raptors with low abundances and lower sensibility to habitat degradation; 3) the Uruguayan Savanna, dominated by grassland species and a few forest species usually found in riparian habitats and submontane forests. The amount of variance explained by the canonical axes was 41.3%. We hypothesize that climatic variables also influenced raptor distributions. Although the threats to grasslands of Araucarian Moist Forest and Uruguayan Savanna ecoregions are quite similar, these areas have differences in habitat availability and raptor assemblages, features that must be taken in account in species conservation.



Abstracts – Oral Sessions (alphabetically)

Investigating the Decline of the Martial Eagle (*Polemaetus bellicosus*) in South Africa

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The Martial Eagle is the largest eagle species in Africa, functioning as an apex predator within its savanna habitat. Across Africa the species has shown considerable declines and is now heavily reliant on protected areas. The species has recently been up listed to Near Threatened by the IUCN and a consultation is currently underway on its further up-listing to Vulnerable or Endangered. In this paper we explore the decline of this species across South Africa, using data from two repeated national bird surveys – the South African Bird Atlas Project 1 and 2 (SABAP 1 – 1987-1992; SABAP 2 2007-2012). These surveys suggest a decline in Martial Eagle reporting rates of 60% over the last 20 years. Alarmingly, these declines also occurred within large protected areas, for example within the Kruger National Park, where the population declined by nearly 45%. Further fieldwork, within one large protected area, also independently confirmed these declines. Despite these declines, the species was encountered six times more frequently within protected areas, and in areas where they did occur they were also twice as abundant within protected areas compared to outside of these areas. Our analysis on the correlates of change provided some support for two hypotheses on the causes of these declines, with climate change (temperature) and power-line densities negatively associated with changes in reporting rates. Within the Kruger National Park, which supports a significant proportion of the national population, declines were also associated with high densities of Elephants which may have reduced nesting opportunities or changed foraging opportunities; more research has recently been initiated in Kruger National Park to further explore these declines.

How Human Constructions Influence the Spatial Distribution of Birds of Prey in Northwest Patagonia?

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Human activities affect biological diversity and species distribution patterns in numerous ways. For instance, cities produce physical changes leading to landscape homogenization, and roads cause habitat fragmentation. Both sources of human disturbance modify the availability of resources and generate novel environments where generalist species are often abundant (considered “winners”), and specialist species tend to be absent (“losers”). We studied the abundance, richness and composition of raptor species, including carrion eaters, generalist hunters and facultative species (families Cathartidae, Accipitridae and Falconidae) in relation to distance to roads and cities. We worked in Northwestern of Patagonia, a region with the highest population growth rate of Argentina, but still with large unpopulated areas. We conducted stationary point counts with a fixed observation radius and time, recording every raptor inside a grid of 22 km by 8 km (77 point counts). We then related the presence of raptors with different distances to sources of human disturbances such as cities, farms, roads, fences and power lines using zero-inflated Poisson regressions. Raptor richness and abundance were positively associated with human environments. Consistent with the “winner/loser species” hypothesis, these results were driven mostly by a strong association of the medium-size generalist species to human environments. Our data did not suggest negative effects on those species presumably called “losers”. A possible explanation for this may be the fact that large species (i.e. Andean Condor) need large home-ranges and they could be flying above suboptimal environments to reach areas where human pressure is reduced. Because roads and cities are increasing in Argentina, our results suggest that the structure of raptor communities will change in the immediate future, as species which take advantage of those novel environments increase.

Peregrine Falcons as Biomonitors: Using Feathers to Assess Mercury Contamination in Southern Nevada, U.S.A.

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Exposure to mercury (Hg) has been correlated with reduced reproductive success and increased mortality in birds. Hg levels in feathers correlates with the accumulated body burden of Hg during feather growth, and is representative of Hg exposure following the previous molt. Feathers are an ideal medium in which to test for Hg because sampling is relatively non-invasive and can be repeated on individuals over time. We measured total Hg levels in feathers of Peregrine Falcons (*Falco peregrinus*) breeding in the Mojave Desert of southern Nevada from 2008–2012, and in feathers from 89 species collected as prey remains of local peregrines. For analyses, we separated peregrine territories by those found in Lake Mead National Recreation Area (LMNRA; $n = 11$; mean eyrie distance to water = 0.2 km) from those breeding elsewhere in southern Nevada (SNV; $n = 6$; mean eyrie distance to water = 27.5 km). All peregrine feather samples contained detectable levels of Hg ($n = 55$, range = 0.08–34.66 ppm), but mean levels found in LMNRA adults (12.9 ppm) were considerably higher than in SNV (2.6 ppm). Prey species, pooled by primary foraging and breeding habitat types, had a mean Hg level in aquatic birds of 4.6 ppm compared to 0.7 ppm in terrestrial birds. Aquatic birds comprised 73% of peregrine diet by biomass in LMNRA compared to 18% in SNV. Sensitivity of peregrines to Hg is currently undetermined. However, the levels we detected in several individuals are cause for concern and are higher than levels thought to impact reproduction and population size of other raptor species.



Peregrines can be an effective biomonitor of Hg contamination and ecosystem health based on their high trophic level, wide distribution, strong site fidelity, and diverse prey base.

Chronic Lead Exposure is Epidemic in Obligate Scavengers in Eastern North America

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Lead is a non-essential heavy metal that poses a health threat to humans and wildlife. In spite of its known detrimental effects, lead is used regularly and is prevalent to an unknown degree in human and natural ecosystems. However, studies of lead in raptors have focused primarily on recent lead exposure in at-risk populations, such as condors and eagles. To understand the degree to which chronic lead exposure and poisoning are widespread in North American wildlife, we quantified pervasiveness of chronic lead exposure within populations of American Black Vultures (*Coragyps atratus*; BLVU) and Turkey Vultures (*Cathartes aura*; TUVU) from eastern North America. Every individual sampled ($n = 108$) had bone lead levels indicative of chronic exposure (BLVU: $\bar{x} = 36.99 \pm 55.21$ mg/kg (\pm SD), range: 4.5 – 540.00; TUVU: $\bar{x} = 23.02 \pm 18.77$ mg/kg, range: 6.17 – 70.00). Few vultures showed evidence of recent lead poisoning (BLVU liver: $\bar{x} = 0.78 \pm 0.93$ mg/kg, range 0.12 – 6.17; TUVU liver: $\bar{x} = 0.55 \pm 0.34$ mg/kg, range: 0.23 – 1.3). We measured stable lead isotope ratios of a subset of BLVU femur samples to determine potential sources of lead. Isotopic analyses were inconsistent with typical known sources of lead (ammunition and paint), suggesting that sources of chronic lead exposure in vultures need to be explored further. The epidemic level of chronic lead exposure in this widespread and common raptor has dramatic implications for understanding modern wildlife and human health concerns.

Analysis of Variation in the Primary Song of Great Horned Owls (*Bubo virginianus*) Throughout their Range

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A largely untested assumption about owls (Strigiformes) is that their primary vocalizations do not vary geographically. We tested this hypothesis by analyzing 34 sound parameters of 233 recordings of the primary song of Great Horned Owls (GHOs; *Bubo virginianus*) distributed among all 14 subspecies ranging from Alaska to southern Chile. We evaluated subspecies based on range maps provided by R. Dickerman (pers. comm. and publications) for North America, and maps by Weick (1999) for Central and South America. We used the program Raven Pro 1.4 (Cornell Lab of Ornithology) to evaluate song and note attributes, and assessed differences of GHO songs between sexes and among subspecies and continents (North, Central, South America) by using discriminant function analysis, ANOVA, cluster classification, and binary logistic regression. We discovered key differences in song structure between sexes, supporting and adding onto published descriptions. We also found key differences among allopatric subspecies, and similarities between parapatric subspecies, especially in South America



supporting in part the contention that the subspecies complex of *magellanicus* and *nigrescens* form a fully separable vocal entity from *nacurutu* and *deserti*. Preliminary analyses also suggest some differences in song structure among at least some of the North American subspecies; more robust analyses will be included in our presentation, including identification of which specific sound parameters contribute to geographic differences in songs. We also determined temporal variation of song parameters of individual owls ranging up to 10 years of recordings, and variation between sexes by analyzing songs from owls of absolute determined sex. We used these ancillary findings to help interpret results of subspecies differences. Our findings may provide some of the first evidence of geographic variation in an owl species across its full distributional range.

Natal Dispersal of Red-tailed and Red-shouldered Hawks Banded in Southwestern California: A 40-year Study

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We report the results of a 40-yr comparative study of natal dispersal in two sympatric *Buteonine* species, the western Red-tailed Hawk (*Buteo jamaicensis*), a habitat generalist, and the western Red-shouldered Hawk (*Buteo lineatus elegans*), a habitat specialist. From 1970 through 2009, we banded 5271 Red-tailed Hawk nestlings and 2742 Red-shouldered Hawk nestlings in southern California. We additionally analyzed records from the Bird Banding Laboratory from other Red-tailed ($n = 189$) and Red-shouldered ($n = 127$) Hawks banded as nestlings in southern California from 1956 through 2009 for a total of 5,460 Red-tailed Hawks and 2,869 Red-shouldered Hawks. Of these, 81 (1.5%) breeding-age (> 46 mo) Red-tailed Hawks and 90 (3.1%) breeding age (> 22 mo) Red-shouldered Hawks were later recaptured, and 32 (0.6%) and 62 (2.2%), respectively, were later recovered. Both species frequently nested within or in close proximity to their natal territory. In the case of Red-tailed Hawks, 24.7% were in the same territory as banded and 97.5% were within 10 home range diameters, while 10% of Red-shouldered Hawks were in the same territory as banded and 82.2% were within 10 home range diameters. Directions from the natal nest were random for both species. Natal dispersal distance for recoveries was significantly greater than for recaptures in both species; median recovery and recapture distance for Red-tailed Hawks was 18.5 and 4.9 km, respectively, and 24.1 and 7 km for Red-shouldered Hawks. There were no significant differences between males and females for either species.

Spring-Summer, Northern Migration of Red-Tailed Hawks Fledged from Southern Latitudes in the United States

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The Red-tailed Hawk (*Buteo jamaicensis*) is one of the most well-studied buteonids. However, many aspects of its migratory behavior remain unknown. We used banding, VHF transmitters, and satellite



telemetry to study migration of Red-tailed Hawks in the U.S.A. and Canada. Of 5460 nestlings banded in southern California, 64 were recovered >100 km from their nest at <46 mo of age which we considered migrants; most (69%) were north of their nest as much as 1462 km. We found migrants banded <35° N in the Pacific Flyway, which includes California and much of western U.S.A., migrated north while those >40° migrated south. Although only two nestlings were banded below 35° in the rest of the U.S.A., data from 35–40° suggest a similar northerly migration may occur in other areas. Thirteen of 16 hawks we equipped with satellite transmitters in southern California that survived >2 mo migrated north (range 342–24°) as far as 1388 km. Ten survived through their first summer, and all returned in late summer–autumn. Our results suggest post-breeding, northward migration of young, non-breeding Red-tailed Hawks is a response to a combination of competition, past climate change, and seasonal changes in prey abundance.

Vagrant Western Red-Shouldered Hawks: Origins, Natal Dispersal Patterns, and Survival

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We report the results of a 40-yr study of the western Red-shouldered Hawk (*Buteo lineatus elegans*) involving the banding of 2742 nestlings in southern California from 1970 to 2009 (this study) plus 127 nestlings banded in other California studies (1956–2008) and the analyses of 119 records of subsequent recovery from the Bird Banding Laboratory (1957–2009). Of the Red-shouldered Hawks recovered, 109 (91.6%) moved <100 km (short-distance dispersers), while 10 (8.4%) moved >100 km (long-distance dispersers). Three (2.5%), all long-distance dispersers, were vagrants (recovered outside the species' range of residency), and were found 374 to 843 km northeast and south of their banding locations in the Mojave, Great Basin, and Vizcaino deserts. The distribution of directions of short-distance dispersal was bipolar, closely corresponding with the northwest-southeast orientation of the species' range in southern California, while that of long-distance dispersers was mainly to the north. One of 10 long-distance dispersers, a non-vagrant, survived well into the age of breeding (103 mo), whereas eight of the other nine perished before 14.5 mo. The implications of vagrancy for conservation of this resident subspecies are that a relatively small source area can contribute genetic material over a vastly larger receiving area but rarely does so because of high mortality rates. Nonetheless, the movements of vagrants we documented provide evidence for the species' potential to populate new landscapes in response to changing environmental conditions and to maintain genetic heterogeneity within existing populations.

Persistent Organic Pollutants in the Urban Environment: Exposure and Effects in an Avian Top Predator, the Cooper's Hawk (*Accipiter cooperii*)

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As top predators, birds of prey are highly exposed to persistent organic pollutants (POPs). These man-made chemicals, which include organochlorine pesticides and industrial chemicals such as flame retardants, have been reported to cause adverse physiological effects and lowered reproductive success in birds from many field and laboratory studies. A preliminary investigation of carcasses from fortuitous sampling in southwestern British Columbia, Canada, reported that the livers of Cooper's hawks were highly contaminated, and had some of the highest reported concentrations of the flame retardant polybrominated diphenyl ethers (PBDEs). We are studying the population of Cooper's Hawks in the Greater Vancouver area to determine exposure of breeding birds, and test for potential effects caused by POPs exposure. Cooper's Hawk nests were located using call-playback, and adults captured using a dho-gaza trap. A sample of blood was taken and plasma analyzed for POPs, hormones and stable isotopes. A subset of birds ($n = 8$) were fitted with VHF transmitters and tracked through an annual cycle. Preliminary results show some evidence of physiological effects due to POPs. Spatial variation in individual plasma POPs concentrations is very variable and correlates with land use and population density within the calculated home range.

Habitat Fragmentation Reduces Occupancy of Nest Boxes by an Open-Country Raptor

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Despite the recent rapid decline of many grassland bird species, the relative importance of habitat configuration to population persistence is unclear. We used Southeastern American Kestrels (*Falco sparverius paulus*) in north-central Florida, U.S.A., as a model system to explore the relative influence of landscape structure components on site occupancy patterns at two spatial scales, and for two different time periods. We focused on the dynamic processes of site-level population expansion or contraction. We modeled the occupancy of 131 kestrel nest boxes with Bayesian state-space dynamic occupancy models that considered both the partially observed process of true occupancy and the probability of detection of occupancy. We used reversible jump Markov chain Monte Carlo (RJMCMC) algorithms to identify variables that described the continued occupancy of nest boxes, or ψ , and the probability of colonization of nest boxes between time periods, or ϕ . Changes in open habitat patch isolation at a fine scale, as estimated by the variability of nearest neighbor distance, predicted site colonization between decades, and patch shape variability was related to ϕ during the early time period (1992-93). We found no strong effects of landscape structure on ψ during the later time period (2008-2010). We also found no evidence for effects of loss of open habitat on box occupancy or colonization. Our results indicate that continued habitat fragmentation would be deleterious for this threatened subspecies. Additionally, certain land cover management practices recommended for the Florida sandhills, such as frequent low-intensity controlled burns, will likely help conservation attempts.

Assessing the Impact of Wind Farms on Raptors: A Worldwide Perspective: South Africa, Chile, and Spain

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Wind energy can lower greenhouse gas emissions, but also has potential impacts on flying vertebrates. I compare impacts in Spain, where 19 000 turbines provide 22 796 MW of installed capacity, to South Africa and Chile with 10 MW, and 190 MW of installed capacity, respectively and ongoing intensive development projects. In Spain, 9406 avian collisions were reported from 175 wind farms sampled for different time periods from 2000-2012. Of these, 4111 (43.7%) involved raptors. Vulture species (Griffon *Gyps fulvus*, Cinereous *Aegypius monachus*, and Egyptian *Neophron percnopterus*) made up 73% of raptor mortalities. Collectively, kestrels, kites and small eagles composed another 21% of raptors, and the remaining mortalities were of 21 *Accipitridae* species, 4 *Falconidae* species and 5 *Strigidae* species. We use data from Lesser Kestrels (*Falco naumanni*) Common Kestrels (*Falco tinnunculus*), Griffon Vultures and Golden Eagles (*Aquila chrysaetos*) to demonstrate that collision rates were species-, season- and site-specific, with migration periods, particularly autumn migration, associated with increased risk. Site-specific risks were impacted by large-scale landscapes far beyond the footprint of an individual wind turbine. Developing wind resource areas in South Africa (17) and Chile (16) due to the size of projects and extensive areas affected, mostly rely on coarse-scale IUCN conservation criteria and limited fieldwork when making citing decisions, despite the fact that South Africa and Chile each support twice the avifauna of Spain, including 72 and 62 red-listed species, respectively (there are only 14 red-listed species in Spain). Lessons of adaptive management learned in Spain should be understood by developers of wind resource areas in these countries. Adaptive management strategies must be implemented and re-evaluated continuously over the life of wind farms, with scientifically supported mitigation measures based on site-specific Environmental Impact Assessments, pre-construction and post-construction monitoring to balance wind development and biodiversity protection.

Strategies for Threatened Species Conservation in Argentina: The Crowned Solitary Eagle's (*Harpyhaliaetus coronatus*) Challenge

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The Crowned Solitary Eagle is a threatened species in Argentina and worldwide. Within Argentina, each province decides administrative matters. This has led to multiple, sometimes conflicting, conservation approaches for Crowned Solitary Eagles. To develop a consistent conservation approach, development of a Crowned Solitary Eagle National Conservation Strategy (NCS) is now ongoing. Following



recommendations made by the Action Plan for the Conservation of the Crowned Solitary Eagle in Argentina, meetings are being held regularly, leading to recommended actions for each province taking into consideration local social and political realities. This strategy gets people together with governmental institutions to fulfill a specific goal: the conservation of the Crowned Solitary Eagle. Some interesting results have consequently been achieved, including: 1) development of surgical, sanitary and rehabilitation workshops which have already been applied to rescued eagles, 2) a rehabilitation center within the species range, 3) a rescue network has been set up, including national and provincial governments, and 4) a Studbook for the species has been established, 5) the distribution of the species is being updated online, and 6) two new educational centers have been created. Overall, provincial governments have offered support and given permission to conduct research in protected areas. Perhaps one of the most important results is that legal documents have been signed by representatives of some provinces in which they agree on specific actions and commit to the protection of the species. Many provinces have joined this initiative. Nevertheless, there remains a long way to go to achieve a national governmental alliance with well-defined objectives and efficient ways to use scarce resources. This seems to be the major challenge for the integrated conservation of the species in the future.

Rehabilitation as a Potential Conservation Strategy for Diurnal and Nocturnal Raptors in Mexico

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Rehabilitation centers, have been gradually gaining more importance in the conservation of birds of prey at a global scale. However, to date implementation of such centers in Mexico has not been possible. A total of 70 diurnal and 31 nocturnal raptor species inhabit the country, and many individuals that suffer injuries, need medical care. Thus, implementation of raptor rehabilitation centers in Mexico as a conservation strategy is needed. The information collected so far by using a survey sent to different rehabilitation centers worldwide shows that the 50% report raptor rehabilitation as a difficult task, mainly because these birds require of expensive infrastructure and maintenance. Nevertheless, 23% of rehabilitation centers work solely with birds of prey. More than half of rehabilitation centers treat all kinds of animals (56%) with raptors making up 30-40% of total patients, and 21% of rehabilitation centers have raptors making up 5-10% of patients. Traumatic injuries related to human activities represent the most common cause of admission. The biggest challenge for the rehabilitation centers is post-release monitoring, achieved in only the 7% of centers, though 8% have only made specific studies in some species. Other centers lack of money or authorization to conduct studies. For 56% of the rehabilitation centers, reported release to the wild success ranges between 30-49% of the birds admitted. The remaining 44% of rehabilitation centers release from 50 to 70% of birds admitted. Non-releasable patients were transferred to academic institutions at 60% of the rehabilitation centers. All rehabilitation centers surveyed included environmental education in their conservation programs, and emphasized that team work, optimization of available resources and modern rehabilitation techniques



were essential. Many conservation strategies may be useful in Mexico, and rehabilitation centers should be part of these efforts.

Movements and Survivorship of Six Rehabilitated Raptor Species Released in Southwestern United States

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From 1995 to 2012, 1026 rehabilitated raptors of 24 species were banded and released within the state of New Mexico. Returns of banded birds were used to assess survival and movements of six of these species. Species with recoveries included: American Kestrels (*Falco sparverius*) three recoveries of 323 banded; Barn Owls (*Tyto alba*) two recoveries of 125 banded; Great Horned Owls (*Bubo virginianus*) nine recoveries of 140 banded; Red-tailed Hawks (*Buteo jamaicensis*) four recoveries of 88 banded; Cooper's Hawks (*Accipiter cooperii*) 10 recoveries of 100 banded; and Swainson's Hawks (*Buteo swainsonii*) two recoveries of 67 banded. Most of the released rehabilitated raptors were Hatching Year (HY)/Second Year (SY) birds: American Kestrels 287 HY/SY, 36 AHY/ASY; Barn Owls 118 HY/SY, 7 AHY/ASY; Great Horned Owls 125 HY/SY, 15 AHY/ASY; Red-tailed Hawks 56 HY/SY, 32 AHY/ASY; Cooper's Hawks 89 HY/SY, 11 AHY/ASY; and Swainson's Hawks 52 HY/SY, 15 AHY/ASY. Individuals with the longest time in the wild were also found the farthest away from the release sites for two species: Red-tailed Hawks (3738 days/724 km), and Cooper's Hawks (2804 days/2462 km). One Great Horned Owl was found 225 km away from the release site after 72 days. One American Kestrel was found only eight km from the release site after 1035 days in the wild. One of the Barn Owls was found 322 km away, 921 days later. Lastly, one Swainson's Hawk was in the wild for 1015 days and assumed to have migrated twice before being recovered close to its release site. As populations of birds in general and raptors specifically are declining worldwide, rehabilitation of raptors will help in slowing the decline of these birds.

Exposure and Health Effects of Oil Sands-Related Emissions on American Kestrels (*Falco sparverius*) in Western Canada

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The world's second largest reserve of crude oil, the Alberta oil sands, are located in the boreal forests of western Canada and are beneath important breeding grounds for local and migratory avifauna, including American Kestrels. While economically important for the region, oil sands industrial activities produce contaminants of environmental concern and the impact of contaminants in emissions on wild birds has been largely neglected. We exposed adult, captive kestrels to inhaled contaminants related to oil sands production at environmentally relevant concentrations. As practical alternatives to kestrels to assess natural exposure, we studied Tree Swallow nestlings (*Tachycineta bicolor*) at two oil sands sites (within 5



km of active industrial sites), and one reference site (100 km from industrial sites). Contaminants in air, measured with passive air monitors deployed at the nest sites, were higher (up to 5-fold) at the oil sands sites for volatile organic and polyaromatic compounds, nitrogen dioxide and sulfur dioxide. Compared to control kestrels and reference nestlings, exposed kestrels and swallows from the oil sands had higher hepatic detoxification enzyme activity ($P < 0.05$). Exposed kestrels had increased spleen somatic index ($P = 0.043$) while swallows from the oil sands had decreased liver ($P = 0.02$) and bursa of Fabricius somatic indices ($P = 0.001$). In the T-lymphocyte skin test, exposed kestrels had an increased response ($P = 0.048$) while swallows from the oil sands had a decreased response ($P = 0.001$). Corticosterone concentration in feathers was lower in swallows from the oil sands ($P = 0.01$), and free and total plasma thyroxine was lower in exposed kestrels ($P = 0.03$). Overall, both species demonstrated suppressed endocrine responses and differential immune responses on the captive and natural exposures. These differences are likely associated with species and age differences. The impact of these effects on long-term health requires further investigation.

Modeling Migration Counts to Estimate Abundance: A Population Estimate for Golden Eagles (*Aquila chrysaetos canadensis*) in Eastern North America

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Golden Eagles in eastern North America are rare, and we lack a precise estimate of the population's size. Like many populations, eastern Golden Eagles face threats to their persistence, and we need a better understanding of their ecology to manage populations in response to these threats. Impacts from anthropogenic threats depend on when and where eagles congregate. Therefore, understanding when and where they move, especially during migration, is important. Using migration-count data provides an opportunity to develop understanding of raptor movements, and such data may be useful for estimating numbers of Golden Eagles. However, multiple individuals may be counted more than once or go undetected, biasing estimates of population size. We simulated Golden Eagle migration with a computer model incorporating regional terrain characteristics and weather to estimate thermal and orographic lift. In the model, individual movements are driven by the amount of lift available and probabilities of flight direction along a principal axis of migration. We used the migration model to estimate numbers of birds that are counted more than once, are missed, or fly near migration-watch sites. Information from flight simulations were used to conduct mark-recapture analysis of eagle count data to estimate population size. We used the age class of eagles as they passed initial watch sites and counted them as recaptures if that age class flew past a subsequent count site within a time reasonable for flight speeds of eagles. This work synthesizes information on eagle flights along with historic count data and provides a novel framework for predicting eagle migration and estimating population size that may lead to improving monitoring of raptors for avian management and conservation. Migration-counts worldwide collect data on raptor movements and this work further demonstrates their usefulness in helping improve knowledge on movement and population ecology of secretive, low-density raptors.



Probable Threats for Vultures: Impact on the Sustainability of Vulture Safe Feeding Sites of Lumbini and Dang, Nepal

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Nepal supports six resident and three migratory vulture species. Among them, Indian Long-billed Vulture (*Gyps indicus*), Oriental White-backed Vulture (*Gyps bengalensis*), Slender-billed Vulture (*Gyps tenuirostris*), and Red-headed Vulture (*Sarcogyps calvus*) have been listed as Critically Endangered, and Egyptian Vulture (*Neophron percnopterus*) as Endangered in the International Union for Conservation of Nature (IUCN) Red list because of the drastic decline in their populations in South-Asia. Ingestion of carcasses contaminated with diclofenac, a non-steroidal anti-inflammatory drug (NSAID) has been identified as the primary cause for their population decline. Symptoms like visceral gout, kidney failure and finally death were observed in the carcasses of vultures which had carcasses with residues of Diclofenac. Vulture Safe Feeding Sites was first established in 2007 at Kawasoti, Nawalparasi in Nepal to provide safe carcasses to vultures. This study was conducted in three Village Development Committees (VDCs) of Rupandehi district (Bishnupura, Rudrapur and Suryapura), three VDCs of Dang district (Ghobodiya, Lalmatiya and Sisaniya) and Vulture Safe Feeding Sites of two districts. The main objectives of the study were to detect probable future threats for vultures and these threat's impacts on sustainability of vulture safe feeding sites (VSFS). Direct observation and questionnaire survey methods were used. During questionnaire surveys, overall 600 samples were selected using a stratified random sampling method. People were supportive of Vulture Safe Feeding Sites but wanted Government to support them to uplift their economic status. Competitors like dogs, crows and eagles were comparatively few in numbers but were found disturbing vultures during feeding. Food scarcity, habitat loss, poisoning, low level of awareness among local people about vultures and NSAIDs, full dependence of people for VSFS management on foreign support and donation were found to be the major threats for vulture conservation and sustainable management in Nepal.

Terrestrial Birds of Prey are Widely Contaminated with Anticoagulant Rodenticides

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Numerous studies, including our own, have reported a high incidence of liver residues of commonly used second generation anticoagulant rodenticide (SGAR) compounds in raptors, especially in rodent-eating owl and hawk species. Among the birds tested, a proportion commonly exhibit symptoms of anti-coagulant poisoning. In the present study we widened the scope of sampling to include other hawk and falcon species. Of 191 raptors analyzed in a recent survey of birds collected from 2005 to 2011 from southwestern British Columbia, 94% had detectable liver residues of at least one SGAR compound.



Barred Owls (*Strix varia*) and Great Horned Owls (*Bubo virginianus*) had the highest incidence of exposure, at 100%, and the greatest residue concentrations; however, 6 of 8 Peregrine Falcons and 11 or 14 Cooper's hawks tested had residues of at least two SGAR compounds, indicating pervasive contamination of the food chains of terrestrial birds of prey. The process by which smaller avian prey of falcons and accipiter hawks are contaminated is not known. Both temporal trends and spatial patterns of SGAR contamination in relation to the degree of urbanization or intensive agricultural activity will be evaluated. We will also further examine the relationships between liver residues of SGARs and diagnosis of anticoagulant poisoning.

Foraging Ecology of Ospreys in British Columbia Revealed by Stable Isotope Analysis

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Like many migratory animals, Ospreys experience different habitats throughout their annual cycle, and adjust their foraging behavior to these different habitats. To understand variation in diet throughout the annual cycle, we calculated stable isotope ratios ($\delta^{15}\text{N}$ and $\delta^{13}\text{C}$) based on samples collected in Osprey eggs and chick plasma from alpine lakes British Columbia. We also conducted feeding watches to quantify actual prey consumed by Osprey chicks. In contrast to non-migratory species, $\delta^{13}\text{C}$ in lipid-extracted egg tissue (protein, presumably derived from breeding grounds) was unrelated to the $\delta^{13}\text{C}$ in non-extracted egg tissue (including lipids). We related lipid fraction $\delta^{13}\text{C}$ in eggs to migratory patterns as revealed by satellite tracking. We concluded Ospreys tend to use more of a capital breeding strategy than previously thought, as egg lipids are derived from the non-breeding grounds. Nitrogen isotope ratios were correlated between incubation and chick-rearing, and between adults and chicks. We related those ratios to what was directly observed in feeding watches. We suggest that individual Ospreys specialize on particular prey items for both themselves and their chicks. Stable isotope ratios were useful at determining the foraging ecology of migratory ospreys in British Columbia.

Raptors Conservation and Rescue Program: Results and Conservation Status of the Crowned Solitary Eagles (*Harpy haliaetus coronatus*) rescued in Argentina

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Large predators are particularly sensitive to disturbances caused by anthropogenic activities. Paradoxically, human intervention is currently essential in resolving problems involving endangered



species. Such intervention includes the rescue, rehabilitation and eventual release of injured individuals into the wild. Programs worldwide are working with these conservation strategies, and have proven to be a successful and necessary tool, contributing to scientific research and to the maintenance of ecological niches. The main goal of this presentation is to present the results obtained by PCRAR after ten years of extensive work with Solitary Crowned Eagles, which is threatened on a national and global scale. Each case was treated differently, with the utilization of a wide variety of techniques ranging from modern falconry to isolation in enclosed areas free from human contact. There have been 20 registered rescues of Crowned Solitary Eagle in Argentina; PCRAR has actively participated in 95% of these cases. The causes of intervention have been due to anthropic factors in 80% of the cases and 20% have been due to natural causes. Rehabilitation proved to be successful in 100% of the cases. 70% (14/ 20) of the individuals have been released back into their natural environment, while two others are soon to be released. The remaining percentage consists of individuals who are fulfilling a role in education and socialization. One case was euthanized. The average amount of time spent on VHF-monitoring and direct observation after release is 6.7 months and with satellite technology the average is three years. Rehabilitation methods have improved and time spent in captivity has shortened over time due to acquired knowledge and experience. Nevertheless, environmental disturbances caused by man are continually on the rise, making it necessary to maintain and improve the techniques used to respond to these changes.

Simultaneous Census of the Andean Condor (*Vultur gryphus*) in Chile

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The Andean Condor is a species classified as Near-Threatened, due to the ongoing decrease in the species' range. In Chile, the Andean Condor is considered Vulnerable and a priority for protection. In various localities, its population size is unknown, although there is evidence for northward retraction of its distribution in some local populations. The causes of population decline in the condor are associated with human factors, including hunting, poisoning, collision with power lines, and habitat loss. In Chile, it remains possible to find high concentration of condors, in sites of carrions and roosts, but there are no estimates of population trends at these sites. The aim of this work is to develop a method of study to estimate the population in Chile, based on simultaneous census. Since 2011, we began a long-term census program observing the Andean Condors, first in the central zone and subsequently throughout the country. From May 2011 to April 2013, we conducted six simultaneous censuses at 10 sites with the participation of 80 volunteers. In central Chile, our results suggest an Andean Condor population greater than estimates in other South American countries. The maximum number of condors at the same time was 294 individuals in one day. When possible, we the age of the condors we observed. Of these, 28.2% were adult, 4.5% were immature, 13.0% were juvenile, and 54.2% could not be aged. Among adult condors, 48% were male and 52% female. Andean Condors were most abundant at roosts occurs during morning hours, with occupants declining by afternoon. Increased counting places and simultaneous censuses throughout the country are needed to better estimate the population and determinate the conservation status of Andean Condors in Chile.



Patterns of Abundance and Population Structure of Andean Condors (*Vultur gryphus*) in Foraging Areas of Central Chile

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The Andean Condor has a social behavior that promotes scavenging at unpredictable, ephemeral sites, called pulsed resources. These resources occur naturally, when livestock or native herbivores die. Resources that were ephemeral during the condor's evolution may become regular and predictable with the presence of garbage dumps or landfills, resulting from urban development. Little is known of the population and structure of Andean Condors. The aim of this work is to introduce new methods to estimate the population structure and abundance of condors as derived from regular foraging areas. From 2005 to 2007, we studied a landfill in central Chile, where Andean Condors gathered to feed, and from 2009 to 2010, we studied condors at nine types of carrion: four of them using bait, and six found naturally in the environment. The maximum abundance of condors in the landfill was 90 individuals, with a tendency to increase during the winter months, and decrease in the summer. Also at the landfill, the number of adult condors was markedly higher than the juveniles, females were significantly more abundant than males, and condors were more abundant during the first half of the day and less abundant in the evening. At bait, we observed a higher proportion of adults (53.4%) than juveniles (25.3%) and immatures (21.2%), and at natural carrion we observed a higher proportion of juveniles (40.3%) than adults (38.8%) and immatures (20.9%). In adults, we observed a higher proportion of males than females at carrion bait (47.5% - 37.5%) and at natural carrion (55.6% - 40.7%). The study of carrion and feeding zones like landfills, provide relevant information to assess the population status of Andean Condors in Chile.

A Review of 25 Years of a Raptor Rehabilitation Program in Québec and its Impact on Conservation

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The Union Québécoise de Réhabilitation des Oiseaux de Proie (UQROP), a provincial raptor rehabilitation program, was set up in 1986 with the collaboration of a veterinary college and the governmental wildlife service in Québec. All 27 raptor species indigenous to the area have since been treated at the facility and nearly 6500 birds have gone through the program. The release success is about 43%. Of 2384 banded bird releases, 167 (7%) band returns were documented, including a Great-horned Owl (*Bubo virginianus*) with a toe amputation, 11 years later. The rehabilitation program covers the whole province of Québec, representing 1 542 056 km², and the 70 governmental fish and wildlife service offices refer more than 55% of the birds. Being protected species under a provincial law, all dead raptors are submitted to the program. An agreement with a courier company allows ground transportation of live or dead animals, and this contributes to the efficiency of the network. All dead raptors are screened for current and



emerging diseases at the veterinary college in association with the Canadian Cooperative Wildlife Health Center. A post-graduate training program in zoological medicine at the veterinary college allowed for retrospective studies and research projects published in scientific journals. Over the years, the database has provided interesting information, for instance, on sexual dimorphism measurements, population evolution and biomedical parameters. The program has played an important role in conservation issues such as the impact of eagle bycatch in fur trapping activities, the protection of peregrine falcons nesting on anthropic structures and the detection of lead in scavenging eagles. An environmental education program is considered a mandatory activity to associate with raptor rehabilitation. This mission has been undertaken by the UQROP since 1990 and millions of people have been informed about raptors by lectures, television documentaries, travelling exhibits, training sessions and internet.

Impacts and Prevention Strategy of Fur Trapping Bycatch on the Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*) in Québec

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A provincial raptor rehabilitation program first noticed an increase in the number of eagle bycatch over the years in Québec. Given this situation, an endangered species working group wanted to investigate the problem by: 1) conducting a retrospective study of rehabilitation databases and bycatch declarations to the fish and game officers, 2) consulting professional trappers, 3) doing a survey of 2887 registered canid trappers in Québec on their knowledge and experience with eagle bycatch, 4) collecting data on morbidity of bycatch, and 5) planning actions to minimize bycatch. Databases showed 234 (98 Golden Eagles, 136 Bald Eagles) cases of bycatch from 1989-2009 in Québec. The incidence of bycatch in rehabilitation, including dead on arrival, for the same period was 47% (14/30) for Golden Eagles and 35% (35/99) for Bald Eagles. Eagle bycatch essentially occurred during canid trapping using an enclosure technique. The rough consensus among professional trappers was that simple modifications of trapping techniques may prevent eagle bycatch. Specifically, these included allowing access to the bait on one side of the enclosure (so the eagle won't pass by a snare), using an olfactive lure (hiding the bait may not be as efficient) and increasing the distance between the bait and the snare. The postal survey (1068 respondents out of the 2887 sendings) revealed that before 2009 only 33% of the trappers had declared their eagle bycatch. Since 2010, a provincial database of eagle bycatch has been maintained by the provincial raptor rehabilitation program in collaboration with the Québec fish and wildlife service, and a trapper information and education strategy was undertaken in collaboration with trappers associations. These actions should reduce eagle bycatch in the future.

Distribution and Status of the Pallas's Fish Eagle (*Haliaeetus leucoryphus*) in Mongolia: A Cause for Conservation Concern?

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The Pallas's Fish Eagle (PFE) is sparsely distributed across a vast swathe of central, eastern and southern Asia, and has been classified as Vulnerable by the IUCN on the basis of population size and reports of declines in many areas. Mongolia has long been considered a breeding stronghold for the species, but evidence for this is unclear. Our objectives were to assess the current distribution and status of the PFE in Mongolia, and to enable a more accurate assessment of the species' conservation status through collation of existing information from the historical literature and a contemporary survey of historical sites and potential PFE breeding habitat. We identified thirty-three traceable locations in the historical literature, of which breeding activity had been recorded in seven. We conducted field surveys at 77 sites between April and October 2005-2011, including 21 historical PFE locations. PFEs were observed at eight sites, all of which were historical PFE locations, but we could find no evidence of breeding activity. Our findings suggest Mongolia is not (and may never have been) a breeding stronghold for the PFE. The lack of eagles at 13 of 21 historical sites surveyed, coupled with a lack of sightings of birds at alternative locations is suggestive of a decline in site occupancy. Our observations of juvenile eagles within one month of the spring thaw suggest that at least a proportion of Mongolian PFEs are breeding at southern latitudes. Future studies to establish these migratory linkages are warranted. These findings, coupled with evidence of declines in other parts of the PFE range indicate a need to re-evaluate the species' conservation status, and in particular to determine the number of mature PFEs present in high quality habitat in the Indian Subcontinent and Myanmar between November and March.

Intrapopulation Variation in Diet and Habitat Use in a Long-Distance Migrant Raptor: A Year-Round Perspective Using Stable Isotopes

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Stable isotope ratios in animal tissues are correlated with diet and can vary with geographical area where tissue(s) were formed, and so can be used to delineate animal origins or diets. We used feather $\delta^2\text{H}$, $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ to explore intrapopulation variability in diet and habitat use in breeding and wintering areas in the Canary Islands population of Eleonora's Falcon (*Falco eleonora*). The species is polymorphic in plumage coloration with a pale and a dark discrete melanin-based colour morphs. Falcons breed late in the Northern hemisphere allowing birds to feed mostly on migratory passerines during autumn. Moulting starts on the breeding areas and is completed on wintering areas, presumably in Madagascar. Cluster analyses of feather data showed three isotopic groups: C1 and C2 from wintering areas and a single C3 from breeding areas. Sexes differed in $\delta^2\text{H}$ for breeding-area feathers suggesting different diets or timing of moulting. $\delta^{15}\text{N}$ suggested that dark birds fed from lower trophic level prey than pale birds in the breeding areas in 2006 but not in 2007. In feathers from wintering areas $\delta^2\text{H}$ differed between years (2007 < 2006). In 2006, pale birds used habitats with higher $\delta^{13}\text{C}$ values than dark birds. Finally, all the bird samples included in C2 were females with particularly positive $\delta^{13}\text{C}$. Our results suggest that diet and/or foraging locations during breeding and wintering differ among sex and colour morphs.



Reversal Learning in the Chimango Caracara (*Milvago chimango*)

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Behavioral flexibility, or the ability to create novel behavioral patterns in an adaptive way, is a frequently studied aspect of animal cognition. Through learning, animals adjust behavior to cope with changes in social and ecological environments. Analyzing the inter-individual variability and age differences, we evaluated reversal learning ability in the Chimango Caracara, an associative mechanism known as a good estimator of behavioral flexibility. Due to their ecological plasticity, we predicted that the Chimango Caracaras would show the ability to discriminate between two stimuli of different color through associative learning with a feeding reward, and to reverse these previously learned associative patterns. Our results showed Chimango Caracaras could discriminate between stimuli, and could reverse such learning. Inter-individual variation in learning was higher in the discrimination (CV = 0.6) than in the reversion (CV = 0.2), though it required a higher number of sessions (DSIC = 2.3 ± 0.8 vs. REV = 5.2 ± 0.4 ; AMR, $F = 9.9$, $p = 0.008$), and involved more errors until reaching the learning criterion (DSIC = 5.8 ± 1.3 vs. REV = 16.3 ± 2.1 ; AMR, $F = 40.6$, $p < 0.001$) compared with discrimination. There were no differences between ages in any of the variables measured (AMR, $ps > 0.1$). These results indicate both adult and juvenile Chimango Caracaras are fast-learners in solving a novel discrimination problem. The results also showed the ability to revert this previously learned association, though at a lower rate compared to the initial acquisition process, which could indicate a more routine-like profile. Thus, new and rewarded behaviors might be preserved immediately after learning. This cognitive capacity probably reflects caracara's flexibility in natural situations, and might represent one of the factors underlying their ecological success, mainly in relation to the utilization of novel and unpredictable environments.

Short-Term Responses of Spotted Owls (*Strix occidentalis*) to Forest Fuel Reduction in the Central Sierra Nevada, California U.S.A.

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Reducing the risk of wildfire in the western United States by reducing fuel loads in forests is a major public concern. However logging (tree thinning) to achieve this fire fuel reduction confers unknown effects on wildlife. Therefore, we conducted the first large-scale experiment to examine the effects of tree thinning treatments on Spotted Owls. Owls whose territories received tree thinning treatments showed greater displacement of home ranges (movement of the geometric center of their home range) following treatment than control owls ($\bar{x}_{\text{treatment}} = 4143.7$ m, SD = 5841.2 m, and $\bar{x}_{\text{control}} = 3958.7$ m, SD = 4458.8 m). However, the 90% credible interval for the treatment effect parameter overlapped zero, indicating no statistically significant effect of the treatment on displacement of the geometric center of the home range (median $\beta_{\text{treatment effect}} = 83.9$, 90% CI = -1459.0 to 1676.0). On the other hand, control



owls tended to show a greater increase in home-range size than treatment owls ($\bar{x}_{\text{control}} = 77.4$ ha, SD = 63.6 ha, and $\bar{x}_{\text{treatment}} = 45.9$ ha, SD = 195.5 ha). This result appeared both counterintuitive and contrary to our *a priori* expectations, so we hypothesized those owls whose home ranges had more habitat also had more options to expand areas of use when disturbance occurred. However, we emphasize caution when evaluating our biological inferences because our sample size was small and confidence intervals large. Nonetheless, our experiment provided valuable lessons for those pursuing large scale projects examining the effect of fuel treatment on wildlife.

Modeling Electrocution Risk for Raptors and Corvids in California, U.S.A. and Rajasthan, India

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Despite a wealth of information on avian interactions with power lines, problems persist throughout the world. Electrocution on overhead power structures negatively affects a broad variety of bird species and contributes to the endangerment of some raptor populations in Europe, Africa, and Asia. Migratory bird electrocutions are also a driver of legal action against electric utilities in North America. Here we report the results of logistic regression predictive models of electrocution designed to allow electric utilities to easily identify and retrofit high risk poles. We created two models, one based on electrocution data collected by an electric utility in southern California, U.S.A., and one based on data we collected in western Rajasthan, India. In California, the most commonly electrocuted species were Red-tailed Hawks (*Buteo jamaicensis*) and American Crows (*Corvus brachyrhynchos*). In India, House Crow (*Corvus splendens*) and Indian Roller (*Coracias benghalensis*) carcasses were most common, but numerous raptor species also occurred. In California, predictive modeling indicated only 4 of 14 variables were necessary to distinguish electrocution poles from comparison poles. These variables were number of jumpers, number of primary conductors, presence of grounding, and presence of unpaved open habitat as the dominant nearby land cover. In India only two of five variables, number of jumpers and insulator height, were important contributors to the averaged model. Insulator height in India was a refined way of quantifying presence of grounding because all poles were grounded. Thus, number of jumpers and presence of grounding were consistent predictors across our two independent data sets and models. Our models offer resource managers and utility personnel a simple innovative approach to reducing avian electrocutions through proactively identifying and targeting high risk poles for retrofitting.

Do Landscape Features Predict the Productivity of Barn Owls in a Changing Agricultural Landscape?

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Population declines of farmland birds have been linked to the loss and fragmentation of grassland habitats resulting from changes in agricultural practices and urbanization. The decline of Barn Owls (*Tyto alba*) in Europe and North America may result from a decrease in productivity related to the loss of foraging habitat and nest sites, increased urbanization, and/or increased mortality due to road development. Where landscape composition and configuration impacts the rodent community, these in turn could indirectly affect the productivity and diet of Barn Owls. We investigated how landscape composition and configuration influenced the breeding performance and diet of Barn Owls in 2007 and 2008 in the Fraser Valley, British Columbia, Canada. We found that the breeding performance of Barn Owls was unrelated to the amount of grass cover or the configuration of foraging habitat within their home range. Likewise, we found no evidence to suggest that landscape had any effect on diet quality. However, the proportion of young that survived to fledging and annual productivity both declined as the amount of urban cover within the home range increased. We suggest that this is due to the negative effect urbanization has on the abundance and/or accessibility of prey.

WHooo Can Be Hurt by Rat Poisons... Are Metropolitan Owls at Greater Risk Than Their Rural Counterparts?

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Second generation anticoagulant rodenticides (SGAR's) are widely used to suppress rodent populations. However, accruing toxicity data are showing that these poisons are negatively impacting non-target wildlife, including secondary poisoning of birds of prey, particularly owls. In Southwestern British Columbia, the percentage of Great-Horned Owls (*Bubo virginianus*), Barred Owls (*Strix varia*), and Barn Owls (*Tyto alba*) with residues of SGAR's in their livers has risen steadily from 70% ($n = 164$) exposure in owls found dead between 1988 and 2003 to 96% ($n = 111$) exposure in the latest study testing owls found between 2005 and 2011. In order to better understand the ecotoxicological pathways leading to such high exposure rates in these owls, we conducted a three year pellets study investigating the diet of these three owl species along a rural to urban gradient in the Lower Mainland, BC. We found that *Microtus townsendi* (40.7%) and *Rattus sp.* (33.4%) were the two main prey items, and that there was a significant inverse relationship between the two prey (Pearson = - 0.93.6, $p > 0.01$, $R^2=0.88$). This inverse relationship was driven by the degree of residential development surrounding each nest/roost site, as the proportion of rats in the diet was positively influenced by the amount of residential development. Surprisingly, a landscape analysis of SGAR contamination in relation to the degree of urbanization showed there was no relationship between these variables, suggesting that there are other vectors besides rats driving the widespread secondary exposure of SGARs, or the application of SGAR's are just as prevalent in agricultural landscapes. These results will be discussed in conjunction with a recent survey on rodenticide usage by farmers and rural residential land-owners throughout our main study area.

Effects of Illegal Poisoning on the Population Dynamics of Eastern Imperial Eagles in Hungary



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The Hungarian population of the globally threatened eastern Imperial Eagle (*Aquila heliaca*) has been slowly but continuously increasing since the 1980's. The Hungarian population recently consisted of 150 breeding pairs, representing 65% of the EU population, though it remains vulnerable and is far from the nation's carrying capacity (saturation). Poisoning of Imperial Eagles was first noticed in Hungary in 2005, and during the last 7 years 65 individuals were found poisoned as a result of deliberate predator control. Thus, poisoning has become the most important mortality factor for the Imperial Eagle in Central Europe. BirdLife Hungary and National Park Directorates started an intensive anti-poisoning campaign in 2008 by involving the most important stakeholders, such as hunters, police and veterinarians. The causes behind the incidents were identified and an action plan was initiated. We show that the sudden increase of poisoning incidents decreased the annual growth of the population (from +10%, on average, from 2003-2006, and to +4% by 2007-2008), although surprisingly it did not reverse the trend in short-time, which could be expected from the huge number of affected individuals. After the anti-poisoning campaign started the number of poisoning incidents decreased dramatically and annual growth of the population increased significantly (up to +18% in average between 2009-2011). Unfortunately, the number of poisoned specimens increased to 17 in 2012, resulting again in a relatively low annual increase in the population (+5%). The high poisoning pressure on the population is probably the main reason explaining the unexpectedly high annual turnover of breeding birds (up to 25% revealed by non-invasive genetic analyses) and of the high ratio of breeding immatures (up to 30%).

Black-chested Buzzard-eagle Population Trends in Patagonia and the Possible Relationship with its Main Food Source

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Long term studies of long lived species of raptors constitute an important tool for understanding demographic variation and conservation efforts. Such studies are more relevant if they can be compared to variability in food sources. The Black-chested Buzzard-eagle (*Geranoaetus melanoleucus*) is a large raptor inhabiting open areas of South America. To date, no studies about its population trends have been undertaken. Here we present the first study of long term Buzzard-eagle population changes, analyzing abundance and age class proportions throughout a period of 20 years. We conducted morning and evening counts of Buzzard Eagles at 21 points surrounding Junín de los Andes, north-west of Patagonia, during the breeding seasons of 1992, 2006, 2011 and 2012. At each count site we estimated the relative abundance of the Buzzard-eagles most important prey, the European hare (*Lepus europaeus*), by conducting 30 minute foot transects. The number of eagles decreased from 59 in 1992, to 37 in 2006, 33 in 2011, and 29 in 2012. Forty one percent of eagles observed in 1992, and 27% in 2006



were juveniles, while in 2011 and 2012 no juveniles were observed. We found similar tendencies of decrease in the presence of hares. The decreasing abundance of juvenile eagles may be related to the decrease in the number of hare in the area. Whether juvenile individuals are dispersing to other areas with greater prey availability, or if their mortality has increased in the area is unknown. We hypothesize that ash deposition from the eruption of Puyehue volcano in June 2011 may have produced a bottom up effect on the eagles. Specifically, we propose that deposition of volcanic ash reduced vegetation, which suppressed hare populations, and subsequently indirectly affected eagle populations..

Landscape Influences on Survival of Post-fledging Ferruginous Hawk (*Buteo regalis*)

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Increasing pressure from development and conversion of native grassland into cropland contribute to habitat loss and degradation for many species. Ferruginous Hawks have experienced significant population declines throughout their range, and are listed as threatened in Canada. Although various factors influence population trends, the post-fledging period is often not understood nor considered when developing recovery and management plans for avian species, even though this period exhibits high mortality rates. Understanding factors that influence juvenile survival could be a key component in reversing population declines. Therefore, in 2011 and 2012, we used radio telemetry to track a total of 101 juvenile Ferruginous Hawks to determine if the composition of landscape features (including agricultural-use type and proximity to wellsites, roads, electrical transmission and distribution lines) can predict areas of high mortality risk. Indices of parental care (*i.e.*, morphometric features of fledglings) were compared to landscape composition around nests to determine if these variables predict mortality. Preliminary analyses indicate habitat surrounding nests does not significantly influence juvenile daily survival; however, juveniles from nests on transmission lines had a higher probability of mortality. Overall mortality rate for juveniles was 36% and most mortalities occurred within 3 km of the nest. Habitat use and mortality were highly correlated with both being greatest in native grassland and cropland; main causes of mortality included predation by Great-horned Owls (*Bubo virginianus*), starvation, vehicle strikes, and probable powerline collisions. In addition, proximity to anthropogenic features did not negatively impact survival; in fact, a positive relationship was determined for proximity to wellsites and electrical distribution lines. Our study suggests that juvenile mortality is not directly correlated with human activities. Regardless of landscape features, high juvenile survival is likely important in maintaining populations, and should be considered in strategies to reverse population declines.

Documenting Variation in Parental Response to a Novel Aerial Intruder: A Small Rotary-winged Unmanned Aerial Vehicle (UAV) Used to Survey Nest Contents

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We surveyed nest contents of Osprey (*Pandion haliaetus*) in Montana, U.S.A., and Swainson's Hawk (*Buteo swainsoni*) and Ferruginous Hawk (*B. regalis*) in Saskatchewan, Canada between 2010-2012 using UAV. Each survey was conducted using a small camera attached to a <3 kg rotary-winged UAV (similar in design to widely available toy helicopters). In most cases, high quality images were obtained, allowing for accurate count of nest contents and an estimate of the age of nestlings. Flight times were brief, each lasting <5 min, with the majority lasting <1 min. Parental nest defense response varied between species; we found Osprey to be more aggressive towards the aircraft, and the other two species to be less aggressive. Based on these preliminary results, we have expanded the scope of our research to measure the variation in parental nest defense response to UAV. We are interested in two questions: does nest defense response vary temporally across the breeding cycle, and does it vary among different raptor species? To measure variation within the nesting cycle, we will conduct 60 UAV nest surveys of Osprey on the Upper Clark Fork River Drainage. Surveys will be split in three groups: egg stage, early nestling (<30 d of age), and older nestlings (>30 d of age). To measure interspecific variation, we will conduct a total of 30 surveys on five different species: Ferruginous Hawk, Swainson's Hawk, Red-tailed Hawk (*B. jamaicensis*), Bald Eagle (*Haliaeetus leucocephalus*), and Osprey. We will gain valuable insight into the variation in nest defense among raptor species and the evolutionary pressures that influence them.

Long-term Dynamics in *Buteo* Territory Occupancy on a Privately-managed Bunchgrass Prairie in Northeast Oregon

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Large remnants of prairie may not be suitable habitat for grassland-obligate wildlife because of unsustainable range management practices. In 1979-80, one of the highest nesting densities of three species of *Buteo* [Ferruginous Hawk (*B. regalis*), Red-tailed Hawk (*B. jamaicensis*), and Swainson's Hawk (*B. swainsonii*)] was documented on the Zumwalt Prairie and surrounding agricultural areas in northeastern Oregon. This area has been managed primarily as livestock summer range since it was homesteaded. Unlike other prairie remnants, land management on the Zumwalt Prairie was consistent over the past several decades, and thus, we predicted territory occupancy of these three species would be constant over time. We also hypothesized territory occupancy would be positively related to local availability of nesting structures within territories. We evaluated these hypotheses using a historical dataset, current survey and habitat data, and occupancy models. In support of our predictions, territory occupancy of all three species has not changed over the 25-yr period. Probability of Ferruginous Hawk occupancy increased with an increasing acres amount of aspen, an important nest structure for this species in this study area. Probability of Swainson's Hawk occupancy increased with an increasing amount of large shrubs and probability of Red-tailed Hawk occupancy was weakly associated with acreage of conifers; nest structures for both species in this study area. Availability of these woody species is changing (increases in conifers and large shrubs, and decline in aspen) which may result in declines in Ferruginous Hawk occupancy and increases in Swainson's Hawk and Red-tailed Hawk occupancy in the future.



Lead Intoxication in Birds of Prey in Germany: A Multidisciplinary Study with Implications for Killing Efficiency of Alternative Ammunition, Hunting Safety and the Health of Venison Consumers

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Lead intoxication caused by ingesting ammunition is the most important mortality factor in White-tailed Sea Eagles (*Haliaeetus albicilla*) in Germany. Between 1/3 and 1/4 of all sea eagle carcasses had toxic levels of lead. Local differences correlated with hunting intensity and practices. We shared this information with relevant stakeholders and politicians. A joint declaration as a result of a conference resulted in follow-up studies that examined the killing efficiency of alternative rifle bullets, safety aspects of different bullet types and their deflecting potential, and the potential threats of lead ingestion to consumers of large amounts of venison in families of hunters in Germany. To evaluate killing efficiency of different ammunition types, we examined nearly 12 000 reports from hunters and compared results with technical information provided by manufacturers. In addition, we necropsied, x-rayed and scanned (by computed tomography) carcasses of harvested game animals. Differences could be attributed to the material used in the bullet, but also to the construction type. Deflecting and ricocheting potential of lead-based versus non-lead bullets have been tested under controlled conditions after shooting on natural ground, stones and wood, indicating no significant differences in the angle but in the remaining energy. Finally, we will present results from venison samples that we examined for lead concentrations and the associated consumption rate calculated for hunters' families, an indicator of risk for infants and adults.

Breeding Montagu's Harriers in croplands of Bavaria, Germany (1994-2011): A Success Story at the Intersection of Biology, Land Use, Protection, and Public Policies

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Germany's Montagu's Harrier (*Circus pygargus*) population was estimated at 250 breeding pairs, when in 1994 two pairs successfully bred for the first time in Mainfranken, northwestern Bavaria, Germany, > 200 km from the nearest population of Montagu's Harriers. Since 1994, the population around Mainfranken has continuously grown to 176 breeding pairs. Mainfranken is a mainly rural area, with small villages, intensive agriculture, and <10% forest cover. Montagu's Harriers nest almost exclusively (98%) in cereal crops. Harvest of winter barley (primary nesting cover) starts as early as June 20, making protection of nests from combines a high priority conservation action, as young typically fledge between early July and mid-August. Between 1994-2011, 1458 breeding pairs were monitored; 973 pairs bred successfully and fledged 3171 young birds. Breeding success was 3.26 young per successful pair and 2.17 young per breeding pair. Besides the obvious timing conflict between harvesting and fledging, other conflicts have arisen. The Special Protection Area established according to European Union Birds Directive 79/409/EWG, is not backed by any legal status of a nationally designated area, thus providing no regulatory authority. An increasing number of biomass projects are using "green rye", which is



harvested in mid-May at the peak of egg-laying. “Green rye” is an ecological trap as it is the tallest crop at this time and attracts many breeding pairs. Additionally, vegetable crops are replacing traditional cereal and corn growers. In the future, the protection of Montagu’s Harriers will have to go beyond annual nest protection efforts. Conservation will require collaboration with agricultural industries to secure the future for the species.

Subsidized Lift in Migratory Flight of Golden Eagles (*Aquila chrysaetos*)

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Flight by birds progresses when an individual either generates its own lift or exploits subsidized lift (e.g., thermal soaring, orographic gliding, dynamic soaring). Large birds typically utilize different types of subsidized lift, but the characteristics and correlates of flight behavior over long spatial and temporal sequences are poorly understood. To evaluate use of subsidized flight and to better understand the evolution of flight behavior and the context for in-flight decision making, we used high-frequency GPS-GSM telemetry systems to monitor northbound migratory flight of 32 Golden Eagles. We modeled flight behavior with a combination of generalized linear mixed models, weighted k-nearest neighbor classification and compositional analysis. Mean modeled flight classification accuracy was 81%. Gliding flight was best differentiated from thermalling flight by speed and turning behavior. Gliding flight and thermalling flight were both best separated from orographic flight by altitude above ground level and speed. Classified flight data suggested that these 32 Golden Eagles spent from 20-56% ($\bar{x} = 40.3\% \pm 2.0$ [SE]) of their northbound migratory transit subsidizing flight through thermalling, from 15-83% ($\bar{x} = 46.9\% \pm 2.4$) of their northbound migratory transit subsidizing flight by gliding, and from 0-65% ($\bar{x} = 12.8\% \pm 2.6$) of their migratory transit subsidizing flight with orographic lift. Use of orographic lift became less prevalent later in the year (i.e., as thermals became more abundant) and was more common at the start and end of the day than in the middle of the day. This analysis provides insight into the extent to which birds use different flight modes and has applied relevance because flight behavior can inform economically important models of collision risk.

Climate Change Correlates of Breeding Phenology and Reproductive Performance in Flammulated Owls in Colorado, U.S.A.

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A growing body of evidence has linked changes in climate to alterations in phenology, distribution, and demographic performance of birds across taxa and geographic regions. Raptors are a critical focus since they occupy high trophic positions and because low fecundity may limit rates of population growth if their abundance declines. While the past decade has witnessed an increased focus on effects of climate change on raptors throughout the world, relatively few studies have focused on raptors compared to other taxa in North America, and how climate change may affect their demographic performance. I examined the long-term variation in the breeding phenology and reproductive performance of Flammulated Owls (*Otus flammeolus*) in central Colorado (U.S.A.) from 1981-2012, in an attempt to elucidate the relationship between breeding parameters and climate change in this insectivorous species. Data from 180 nests revealed that Julian dates of incubation onset, which decreased by 0.15 d/yr, were negatively correlated with mean temperature for the month of May, a time period coinciding with the onset of territory defense, courtship, and incubation in the owls. Number of fledglings/brood also was negatively correlated with onset of incubation, and with January-to-June precipitation, which declined by nearly half over the study period. The mean number of fledglings/brood declined by more than 35% in years when January-to-June precipitation fell below 10 cm (2.1 ± 0.1 [SE] fledglings/brood vs. 1.3 ± 0.3 fledglings/brood). This decline in productivity was in part associated with increased nest predation, primarily by red squirrels (*Tamiasciurus hudsonicus*), which depredated nests in tree cavities during the incubation and nestling stages. No climate-related changes in density of breeding pairs were detected during the study period. Further studies are needed to more fully understand how climate change may affect demographic parameters of raptors and may mediate complex interactions across trophic levels in ecosystems.

Mercury in Grey-headed Fish Eagles and their Prey at the Tonle Sap Lake, Cambodia

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The Grey-headed Fish Eagle (*Ichthyophaga ichthyæetus*; GHFE) is a globally near-threatened species thought to be in population decline throughout its range. Studies of a regionally-significant, high-density GHFE breeding population in the seasonally-flooded swamp forest at the Tonle Sap Lake in Cambodia have identified two main threats to the population's stability: the unsustainable mass-harvesting of water snakes (GHFE prey) for human consumption and the wildlife trade, and the development of multiple hydropower dams in the upstream Mekong River that have the potential to deposit large quantities of mercury in the downstream swamp forest at Tonle Sap Lake, and also cause significant changes to the seasonal flood regime of this important wetland. Apparently poor GHFE reproductive success and a paucity of juvenile GHFE sightings at Tonle Sap Lake may be indicative of exposure to toxic mercury concentrations. We collected samples during the 2012 breeding season and measured mercury concentrations in GHFE eggs ($n = 3$), adult moulted feathers ($n = 5$), nestling feathers ($n = 5$) and prey items (fish and watersnakes, $n = 64$). Mean (SD) mercury concentrations (ppm dw) were 0.392 (0.105) in eggs, 1.615 (0.344) in adult moulted feathers, 1.54 (0.377) in nestling feathers, and 0.229 (0.178) in prey items. Mercury concentrations in all matrices were sometimes greater than thresholds of concern for



mercury effects in birds, but likely did not entirely explain the GHFE's apparently poor reproductive success.

Birds of Prey: Research on Decay Changes and Determining the Time of Death

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Understanding decomposition rates and identifying the time of death for a raptor carcass can help researchers understand mortality factors when study animals are found dead. Studies of raptor decomposition are rare, however. To increase understanding of decomposition rates, we monitored carcasses of *Bubo bubo* ($n = 5$), *Buteo buteo* ($n = 12$), and *Accipiter nisus* ($n = 3$) at the Birds of Prey Rescue Centre from Oct 2011 through Oct 2012. The aim of the study was to determine key indicators that could be used in determining the time of death based on macroscopic decay changes. We found existing models of decomposition based on the observation of decay changes in mammals cannot be used in birds of prey. The bloat phase, typical for mammals, did not manifest in any observed carcasses, nor did eye bulking. The life cycle of common Blow fly (*Calliphoridae*), a common guideline for determining the time of death in mammals, must be taken into consideration with caution in raptors, while greater focus should be given to the life cycle of Flesh flies (*Sacrophagidae*). Ants and other predatory insects do not act as accelerators of the decay process but rather as relays because they feed on the larvae of flies. Meteorological data, for instance, wind speed, temperature of air and soil, and precipitation are an important source of information that must be taken into account to accurately determine the post mortem interval. Body mass loss during the process of decay shows certain regularity with all observed carcasses regardless of the species, weather conditions and initial body mass, which is important for determining the present stage of decay. Puparium are always under the carcass and traces of intense enzymatic reactions of pupae are visible for weeks after a carcass has been removed.

Biotic and Abiotic Factors Influencing Directness of Migratory Flight Paths of Golden Eagles (*Aquila chrysaetos*) in Eastern North America are Scale Dependent

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Mechanisms controlling migratory flight behavior have direct consequences for fitness. We explored the influence of several biotic (flight speed, age, sex) and abiotic (weather, day of year, topography) factors on the directness of migratory flight at multiple spatial scales for 32 Golden Eagles in eastern North America. At a daily scale, spring flight paths were influenced by weather and topography. Increased solar radiation, which promotes thermal development, and the presence of tailwinds resulted in straighter flight paths because drift in thermals occurred parallel to the axis of migration. Conversely, increasing speed of headwinds resulted in more sinuous paths as birds drifted in the direction opposing the primary axis of migration. Long-linear ridges of the Ridge and Valley Province in central Pennsylvania provided leading lines where straight-line orographic lift was available. When conditions for thermal development were poor, flight was straighter within this region compared to other regions. At broader scales, biotic factors drive flight path tortuosity. At the regional scale, the interaction between age and sex was an important determinant of directness of flight, where non-adult females flew least directly and non-adult males flew most directly. These differences may be a result of variation in physiology, behavior, development, timing of migration, or possibly morphology. At the scale of the full migratory path, distance, age, and speed were important determinants of directness of flight. Wind drift and age-related differences in the learned ability to compensate for drift, as well as exploration by non-breeders, and aggressive territorial defense by breeding birds are likely mechanisms driving more tortuous flight paths of non-breeding birds.

Post-dispersal Movements and Juvenile Survival of the Solitary Crowned Eagle (*Harpyhaliaetus coronatus*) in Central Argentina

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We tracked 10 juvenile Crowned Solitary Eagles from nesting sites in La Pampa province of Argentina using GPS transmitters to investigate post-dispersal movements and survival rates. The Crowned Solitary Eagle is an endangered South American species with population estimates ranging from 250-1000 individuals. Little is known about the basic biology of the species including movement patterns of juvenile birds. We found fledglings had lengthy post-fledging periods with dispersal from natal territories occurring at an average of 236 days old (95% CI: 218-252). Dispersal coincided with the start of the next breeding season. Juvenile eagles dispersed widely in the first year (\bar{x} = 300 km; 95% CI: 124-477 km). Eagles dispersed into the Argentinean provinces of Cordoba, San Luis, La Pampa, Rio Negro and southern Buenos Aires including areas of Calden forest, pastures, ranches, and agricultural areas. We estimated post-dispersal home ranges (95% kernel utilization distribution) for four eagles (\bar{x} = 4449 km; 95% CI: 0 – 8943 km). Tracking data revealed humans are a significant threat to the Crowned Solitary Eagle with 30% of tracked juveniles dead in their first two years from electrocutions or from shootings. We recommend expansion of education campaigns to reduce persecution and targeted retrofitting of electrical infrastructure to decrease electrocutions throughout the species range.



Blood Parasites in Two Wild Barn Owls (*Tyto alba tuidara*) from Chile - Case Report

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Owls can be carriers of blood parasites such as *Plasmodium*, *Haemoproteus*, and *Leucocytozoon* species, speeded via insect vectors. In general, *Plasmodium* species are more pathogenic than *Haemoproteus* or *Leucocytozoon* because *Plasmodium* display a lower degree of host specificity and cause more severe blood pathology. However, some hemoproteids also cause disease in birds. Blood smear evaluation allows rapid diagnosis. Although molecular methods are more sensitive and specific, they are not available for routine diagnosis in most veterinary laboratories. As far as we know, no data are available concerning blood parasites in Chilean Barn Owls. The aim of this study was to report blood parasite infections by blood smear evaluation and hematologic abnormalities in two wild Barn Owls received in Centro de Rescate de Fauna Silvestre (CEREFAS), Universidad Austral de Chile, Valdivia. The first animal presented traumatic injuries and dehydration. Blood smear evaluation revealed *Plasmodium* species infecting erythrocytes, anemia, lymphocytosis and reactive lymphocytes. Rouleaux formation due to a possible hyperglobulinemia was also observed. The second animal had no clinical signs of disease. *Plasmodium* species and *Haemoproteus* were seen in blood smear. Leukocytosis and heterophilia were observed. Gutiérrez (1989) showed that every Spotted Owl tested in one study had at least one blood parasite (*Leucocytozoon* or *Haemoproteus* species) and 79% had simultaneous multi-species infections. Hematologic changes described in the first animal could result from trauma or *Plasmodium* infection. Combined infestation and trauma-induced stress are factors that can induce clinical disease in owls. The absence of clinical signs in the second owl does not decrease the importance of blood parasites and, heterophilia is a common feature in infected birds. Blood parasites are indicators of immune quality in birds and can have negative fitness impacts on the host. This study alerts for the possible infection of blood parasites in rescued Barn Owls from Chile.

Field Identification of Individual White-headed Vultures Using Plumage Characteristics

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Identifying individuals during the study and management of animal populations is often difficult and has led to the development of various methods of marking to facilitate re-sightings. However, in some cases, study animals cannot be marked for reasons such as cost, safety, or logistics. Variation in natural markings can sometimes be sufficient to identify individual animals, and this has been used successfully for a variety of taxa, particularly marine and terrestrial mammals, but more rarely for birds. Using an information theoretic approach, this study outlines a novel method of identifying individual White-headed Vultures (*Trigonoceps occipitalis*), using patterns in the median wing covert feathers. The individually distinctive median covert pattern is described for the first time, and the information content of this pattern is shown to be high (median information content 23.54 bits). The probability of pattern recurrence in a population of approximately 10 000 birds is very low (2.04×10^{-3}) and is thus a reliable means of identifying individual birds. The pattern does not change noticeably between years and is



possibly maintained for many years. Modern photographic equipment and a network of keen bird watchers means that within protected areas (to where this species is largely confined), there is an opportunity to apply this non-invasive technique for long-term population monitoring of this species.

Latitudinal and Altitudinal Shifts by Golden Eagles (*Aquila chrysaetos*) from the Southwestern United States

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Other than wanderings by some non-breeding individuals, Golden Eagles in the contiguous United States generally are thought to be year-round residents. Twenty-two fledgling Golden Eagles that we marked with GPS-Platform Transmitter Terminals (PTTs) in northwestern New Mexico, southwestern Colorado, and northeastern Arizona during 2010–2012 survived >1 yr. Nine (41%) of the eagles abruptly moved northward 370–1240 km from areas near (<100 km) their natal sites during late spring, when 12–14 mo old. Four of these eagles were monitored from spring 2010 (one individual) and 2011 (three individuals) through spring 2013. All four settled in northerly ranges in May and remained as late as November, then migrated back to natal latitudes, generally following the same routes used for their northward spring migrations. The sole migrant eagle marked in 2010 exhibited similar migration timing and route use during 2011 and 2012; its summer range the second year was about 80 km from that used the first year. Migrations were completed in 2–8 d. As of late May 2013, six of 12 golden eagles marked as fledglings in 2012 had moved up to 1240 km north of their natal latitudes. Two of three territorial adult Golden Eagles marked with PTTs in winter 2011, that did not nest that year, subsequently migrated northward. Last, we documented altitudinal shifts by Golden Eagles from 1750–2450 m to above treeline (>3300 m) for up to 2-month periods during late spring through late fall. Our initial observations suggest that from May to September a substantial proportion of non-breeding Golden Eagles from the southwestern United States migrate to, and reside in, more northerly regions, while others often reside high in mountains.

Monitoring Abundance of Golden Eagles in the Western United States

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Under the Bald and Golden Eagle Protection Act, the United States Fish and Wildlife Service (Service) can authorize take of Golden Eagles (*Aquila chrysaetos*), including nest removal, disturbance, and lethal take, if the take is compatible with the preservation of the Golden Eagle. The Service needs baseline information on the current abundance and trends of subpopulations of the Golden Eagle to properly manage take of the species. Annually during late summer of 2006–2012, we used distance sampling procedures along ~17,500 km of aerial line transects to estimate Golden Eagle abundance in four Bird Conservation Regions (BCR) that collectively cover about 80% of the species' range in the coterminous



western United States. We estimated a study area abundance of 24,509 (90% confidence interval [CI]: 19,406 – 31,947) in 2012, including all breeding and non-breeding individuals. We used a Bayesian hierarchical model to estimate trends in individual BCRs and the entire study area based on numbers of Golden Eagles counted along surveyed transects. The analysis indicated no statistical evidence of a non-stable population for each BCR during 2006–2012 (90% credible intervals [CRIs] for trend coefficients encompassed 0.0). However, we detected declines (90% CRIs < 0.0) in numbers of Golden Eagles classified as juveniles in BCR 10 (Northern Rockies) and BCR 16 (Southern Rockies and Colorado Plateau) during 2006–2012. Continuation of this monitoring effort will provide consistent baseline information on Golden Eagle abundance and trends across the western United States, and allow the Service to evaluate the potential effects of authorizing take requests.

Anthropogenic Drivers of Behavioral Change in Adult Ferruginous Hawk (*Buteo regalis*)

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Digital video monitoring of raptor nests is used broadly across many species and regions to quantify prey delivery rates and composition. However, nesting behaviors, such as adult nest attendance and flushing, can also be documented effectively using this method. Our objectives were to relate Ferruginous Hawk behaviors to anthropogenic disturbance stimuli near the nest site. To address this objective we used digital video recorders (DVRs) on >90 nests to monitor Ferruginous Hawks over three breeding seasons. Ferruginous Hawk behaviors were examined in relation to traffic volume and timing as well as disturbance by industry and researchers. Ferruginous Hawks responded variably to anthropogenic stimuli. Some Ferruginous Hawks demonstrate flushing behavior in response to traffic events. However, traffic volume does not influence Ferruginous Hawk daily nest attendance. The proportion of time spent on the nest decreased significantly for 2 hr following a direct nest visit. Furthermore, the probability of delivering a prey item decreased following a nest visit and subsequently increased over time. We will present analyses of video data that highlights the response of Ferruginous Hawks to anthropogenic disturbance stimuli as well as caveats and limitations for consideration by researchers using video surveillance techniques on raptors.

Dispersal, Movements, and Survival of Juvenile Golden Eagles (*Aquila chrysaetos*) from Northern Norway

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During 2002–2009, we tagged 25 Golden Eagle nestlings in Finnmark, northern Norway (69.5–71 N, 22–26 E). The nestlings were approximately eight weeks of age, 14 males and 11 females. Twenty-two of the transmitters had GPS capabilities, and we received a total of >18000 GPS positions. Dispersal often occurred as a two-stage process, with a pre-dispersal excursion of >10 km with subsequent return.



Permanent dispersal occurred mid- to late October. After permanent dispersal, the general direction of movement was southerly, mainly down through Sweden, although birds visited all neighboring countries in the north (Sweden, Finland and Russia). Birds born on the coast dispersed later than birds from the inland. Most birds stayed south in the winter, with a return migration in spring. This pattern repeated itself in the following years during their sub-adult part of life. Often the spring movement resulted in an “overshoot” due north of their natal areas. One male used the same wintering area in central Sweden during five consecutive winters. Virtually no movements were recorded during midnight hours, while the highest rate of movements was recorded during mid-day (1200-1400 H). Illegal killing was assumed in three cases; two transmitters were found with harnesses cut off, and one was dumped at a landfill. Mortality during the first year of life was quite high, as only approximately half of them survived through their first year of life. In two cases, birds wearing transmitters were identified at feeding stations in Sweden in their 6th year of life, without emitting transmitter signals. The project has provided new insight of the dispersal and movements of juvenile Golden Eagles from the northernmost breeding population of this species in the world.

Declining Little Eagles Near Canberra, Australia: The Link Between Rabbits and Eagle Breeding Success is a Myth, but is Poisoning From Pindone a Problem?

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The Little Eagle (*Hieraaetus morphnoides*), a rabbit predator, is declining in parts of southeast Australia, including the Australian Capital Territory (ACT). Some researchers have blamed the Little Eagle decline on the Rabbit Haemorrhagic Disease Virus (RHDV), introduced to control numbers of European rabbits (*Oryctolagus cuniculus*). However, no Australian raptor has shown changes in breeding densities or breeding performance with increasing or decreasing rabbit numbers. Furthermore, the claim that Wedge-tailed Eagle (*Aquila audax*) clutch size decreased after myxomatosis decimated rabbit numbers in 1951 is probably a myth. Clutch size remained constant in the 1950s when rabbit numbers fell to their lowest, then decreased in the 1960s – 1990s after rabbit numbers increased. Moreover, European rabbits in the ACT have been increasing, not decreasing, apparently because a non-pathogenic lagovirus related to RHDV, termed Rabbit Calicivirus Australia 1 (RCV-A1), is protecting rabbits from RHDV in higher elevations and cooler areas of southeastern Australia. To counter the failure of RHDV to control rabbit numbers, the chemicals Pindone (2-pivalyl, 3-indandione) and 1080 (sodium fluoroacetate) are used to poison rabbits. The toxicity of 1080 to wildlife is well-known and well-tested, but Pindone was introduced with little or no testing. Pindone may disable raptors and/or be fatal to them. Little Eagles take proportionally more rabbits than do Wedge-tailed Eagles, so Little Eagles may be more affected by secondary poisoning.

Does the Relative Abundance of Large Versus Small Arboreal Marsupials Determine Sexual dimorphism in Powerful Owls?

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Most diurnal and nocturnal raptors exhibit Reversed Sexual Dimorphism (RSD); for example, females of the Australian Southern Boobook (*Ninox novaeseelandiae*) are larger than males. However, the Australian Powerful Owl (*Ninox strenua*) exhibits Normal Sexual Dimorphism (NSD), with males larger than females. The large mean prey size taken by Powerful Owls, the lack of asymmetrical ears in *Ninox* owls, the proportion of large versus small arboreal marsupials available in eucalypt forests, the Powerful Owls' habit of roosting on a limb with dead prey during the day, and the defense potential of arboreal marsupial prey may be clues to understanding NSD in large *Ninox* owls.

South East Asian Vulture Crisis – Where We Are Now

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In the late 1990s, it was discovered that the three most common species of *Gyps* vultures in South East Asia had declined by up to 99.9%. The cause was a drug called Diclofenac, a non-steroidal anti-inflammatory drug (NSAID) invented in the 1960s by Novartis. This drug is completely toxic to all *Gyps* vultures and it may be toxic to other groups of raptors, although this has yet to be proven. The drug (which in the 1980s became licensed as a veterinary drug in Southeast Asia, South America and Africa) was used extensively in cattle, thus causing the catastrophic decline in vultures. Since then the drug has been banned as a veterinary drug and five vulture breeding centers have been set up, having bred all three *Gyps* species. Vulture Safe Zones (pioneered in Nepal) have been started and have proved to be successful in keeping vultures numbers stable, and in some cases increasing numbers and supporting local nesting attempts. These zones are now being initiated within India, with a potential release date of 2016. The areas will be free from diclofenac and will be crucial to the success of the program. Unfortunately, diclofenac is still produced for humans, and in bottle sizes large enough to be used for cattle. Other NSAIDs are being marketed with a different name, but contain the same active ingredients, and thus are just as toxic to the birds. Therefore, the status of *Gyps* vultures has recently improved, but their future cannot yet be considered safe again.

Home Ranges of Cape Vultures (*Gyps coprotheres*) and Their Use of Power Lines and Protected Areas in Southern Africa

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Cape Vulture populations have declined across their range due to multiple anthropogenic threats. Their susceptibility to fatal collisions with an expanding power line network and the prevalence of contaminated carcasses and other threats outside protected areas has been linked to rapid population



declines. We used GPS-GSM units to track movements and delineate home ranges of five adult (mean MCP = $121,655 \pm 90,845 \text{ km}^2$) and four immature (mean MCP = $492,300 \pm 259,427 \text{ km}^2$) Cape Vultures. They travelled >1,000 km from the capture site and collectively entered five different countries in southern Africa. Their movement patterns and core foraging ranges were closely associated with the spatial distribution of transmission lines which were frequently and preferentially used for perching and roosting. There is evidence that the construction of power lines has allowed the species to extend its range to areas previously devoid of suitable perches. The distribution of locations of known Cape Vulture mortalities caused by interactions with power lines corresponded to the core ranges of the tracked vultures. Although some of the vultures regularly visited breeding colonies located inside protected areas, the majority of their foraging activity took place on unprotected farmland. The high proportion of time spent in the vicinity of power lines and outside protected areas, together with their ability to travel vast distances very quickly, make Cape Vultures, particularly immature individuals, especially vulnerable to negative interactions with an expanding power line network and the full range of threats across the region. These findings confirm that coordinated cross-border conservation measures beyond the boundaries of the protected area network will be necessary to ensure the future survival of threatened vultures in Africa.

Movement Patterns of Saker Falcons (*Falco cherrug*) from Juvenile Dispersal to Adult Habitat Use Revealed by Satellite Tracking

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Conservation of the Saker Falcon started >30 years ago in Hungary and Slovakia and efforts gradually expanded to all European range (holding about 700 pairs in total) states. Activities intensified as the European Union's LIFE program started to support conservation of Saker Falcons in 2006. Since 2007, > 60 juveniles and 14 adults have been equipped with satellite tracking devices in Hungary, Slovakia, Romania and Ukraine. Juveniles left the natal area 1.5 months after fledging. Up to the first autumn migration, juvenile Saker Falcons may disperse to >1000 km, but most of the birds remain much closer. Juveniles may disperse in all directions, although east was the main direction we detected. They use temporary settlement areas (TSA) in order to explore an area. In the first autumn, most juveniles show a southwesterly migratory movement, resulting in a parallel migration pattern. Migration distances range from a few dozen to >3000 km. Saker Falcons migrate on broad fronts and are able to cover >1000 km in one flight. In our study, only females migrated to Africa. Migratory behavior changes in the second year and Saker Falcons return to previous wintering areas. In spring, they return to the previous autumn's TSA, but then begin a nomadic movement until autumn, when they return to the wintering site. These cycles are repeated until their first breeding. Males are more philopatric, generally making ever closer circles around the fledging area until their first breeding. The furthest breeding dispersal was 1200 km (female). Adult males maintain strict territorial boundaries. Saker Falcons may change nest location and eyrie (>10km) to a better quality one after their first breeding attempt. In case of breeding failure, adults



may show nomadic movements. Saker Falcons that were tracked showed an extremely strong affiliation to flat lowland areas.

Population Demography of the Northern Goshawk (*Accipiter gentilis*) on the Kaibab Plateau, Arizona, U.S.A.

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Northern Goshawk populations are thought to have declined due to habitat loss from cutting of forest trees, but studies of cutting effects on populations typically lacked sufficient annual sampling for this elusive species or were conducted over too few years. In a 20-year mark-recapture study of goshawks on the Kaibab Plateau, we detected 125 goshawk breeding territories, spaced a mean of 3.8 km apart across the 1,728 km² study area. The population showed high annual variation in reproductive measures such as proportions of territories with eggs, brood sizes, and nest failure rates; these closely tracked inter-annual variation in precipitation and prey abundance. Proportions of territories with eggs ranged from 7% to 87% over the 20-yr study. Once eggs were laid, breeding success was 83%. Annual recruitment of breeders was fairly constant at 43% and the proportion of locally-hatched (banded) recruits averaged 37% of total recruits; 63% were immigrants. Mean age at first breeding was 4.3 yr for males and 4.1 yr for females. Peak survival of 446 adults was 0.77/yr (both genders) at about year 9; thereafter survival steadily declined. Maximum lifespan for 104 known-aged goshawks was 13 yr for both genders. Taken together, a stable age distribution (indicating a lack of recent changes in birth + immigration and mortality rates), a relatively high and constant apparent survival of male and female breeders, the absence of breeding by 1-year-old goshawks (indicating a lack of vacant territories), a 4.2 yr-old mean age at first breeding, a regular distribution of territories on the study area, high territory fidelity of breeders, and annual λ values of 0.969 (SE=0.041) for females and 0.922 (SE=0.040) for males, both with 95% CI overlapping 1, suggested a study area saturated with a stationary population of breeders with a premium on attaining and holding a territory.

Impacts of DDT on Raptor Populations: A Perspective Fifty-one Years After *Silent Spring*

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With the exception of the California Condors (*Gymnogyps californianus*) in coastal California, sensitive avian populations, including raptors that feed on birds or fish, have now recovered from the effects of DDE, the environmental derivative of the insecticide DDT. These effects consisted primarily of depressed reproduction associated with changes in the structure of eggshells. In the United States, continuing use of large quantities of DDT would surely have completed the process of local extinction of the Peregrine Falcon (*Falco peregrinus*) and of the national emblem, the Bald Eagle (*Haliaeetus leucocephalus*) in all or almost all areas of the lower 48 states. In her classic book *Silent Spring*, Rachel Carson noted that depressed reproduction of Bald Eagles in Florida appeared to



be caused by a new factor in the environment, which we now know to have been DDE. Courtroom efforts of the Environmental Defense Fund ended DDT use in the U.S.A. Reasons for the ending of DDT use in North America and western Europe were valid in the rest of the world with one notable difference. DDT applied to the interior walls of houses in the anti-malarial programs slowly evaporates, contributing to the DDE burden in global food webs, but does not have the undesirable results of outdoor use in gardens, croplands and forests. With no DDT use in agriculture and forestry, the amounts of DDT used in the malaria programs would never result in food web levels that would affect the most sensitive of raptor species. The continuing controversy about environmental effects of the DDT used in the malaria programs has therefore no foundation. That Rachel Carson should now be castigated as a “perpetrator of genocide” in so many websites is an injustice urgently in need of correction. It is not a question of “people or birds”.

Multi-scale Forage Selection by the Arctic Peregrine Falcon (*Falco peregrinus tundrius*): Choosing Foraging Sites and Prey Items

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Prey selection can be thought of as hierarchical: a predator first chooses where within its home range to forage (third-order selection), and then selects which prey items to consume once foraging (fourth-order selection). Examining factors that influence third- and fourth-order selection will lead to a clearer understanding of the foraging habitats that are critical for predators and the impacts fluctuating prey abundances may have on predator populations. In this study we monitored a population of Arctic Peregrine Falcons breeding among the Coxe Islands and the mainland of the Northern tip of the Melville Peninsula in Nunavut, Canada, to determine how foraging adults select (1) foraging sites and (2) individual prey items. Using GPS relocations from adult falcons equipped with Platform Transmitting Terminals we first identified core areas within home ranges that were used for foraging. We then related prey abundance and various habitat characteristics within foraging sites to those at random locations within home ranges to determine what drives third-order selection. To investigate prey selection (fourth-order selection) we compared the abundance of each prey type within peregrine home ranges to the abundance of each prey type used by foraging peregrines. Although our analysis is ongoing, preliminary results suggest song and shore birds are the most commonly used prey type. More robust results, including the abundance of each prey type within home ranges and the factors that drive foraging site selection, will be included in our presentation.

Swainson's Hawk Small Populations Overwintering In Baja California Peninsula, México

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The Swainson's Hawk (*Buteo swainsoni*) is a raptor species with conservation problems mainly due to habitat loss and prey decrease through its breeding distribution. This raptor has also experienced



massive mortality events on wintering grounds mainly due to insecticide poisoning in Argentina. Although its migratory routes have been determined for many of its populations and it is known that most birds overwinter in Argentina, little is known on their wintering grounds in Mexico. For Baja California peninsula only few records exist on migrant birds and this region has been considered of poor importance for migrant Swainson's Hawks. In this paper, we present information on numbers of recorded Swainson's Hawks in the middle portion of the Baja California peninsula, up to 500 birds overwintering in the area in 2009 and 2012. This species spent those winters in Baja California peninsula in agricultural land and preyed upon mainly on Orthoptera (>95% items, N>40,000 prey). We discuss on the relationship between Swainson's Hawks numbers overwintering in the peninsula and the previous summer rainy season. We also discuss on the importance of invertebrates for hawks in terms of biomass, proteins and carotenoids to fulfill their requirements for migration likely helping to increase the health of hawks.

Global Owl Distribution, Diversity Analysis, and Conservation Hotspots

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Global diversity assessments and databases provide a basis for studying patterns and changes in species distribution and diversity, especially in light of global issues such as climate change. As apex predators, owls can play a significant role in providing for broader ecosystem-level conservation and analysis. Because they are excellent indicators of biodiversity and ecosystem health, owls can be used to identify conservation targets and at-risk areas. By studying and conserving owl species, larger biodiversity conservation goals can be achieved. This project developed a geodatabase of 211 species range maps and analyzed the global distribution of owls for the Global Owl Project (GLOW). The purpose of this research was two-fold: 1) to inform conservationists and researchers of the Global Owl Project geodatabase for research and contributions, and 2) to assess global owl distribution and identify conservation priorities. The largest grouping of owl species in the same geographic area is 20, though 5 to 10 is more common. Threatened species ($n = 32$) are concentrated along the west African coast and on islands, especially in the South Pacific. About one third of all owl species ($n = 75$) fall into the restricted-range category, mostly in the Western Hemisphere and Africa. We identified 3 major hotspots, South America, Africa, and Indonesia, that have a relatively high number of irreplaceable cells because the number of species within them are threatened or have a restricted range. These diversity hotspot maps identify three major conservation target areas from a weighted analysis of threatened and endemic species that represent ideal locations for concentrating conservation efforts for owls. The correlation between the owl species hotspots and other studies on species diversity supports the claim that owls can be used as bioindicator species for biodiversity analyses.

Early Fall Congregations of Swainson's Hawks (*Buteo swainsoni*) in Southern Alberta

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Near the northern extent of the breeding range for Swainson's Hawks (*Buteo swainsoni*), the province of Alberta, Canada is host to fewer than 10,000 breeding pairs throughout the grassland and parkland natural regions. Swainson's Hawks return to Alberta late in spring relative to other *Buteo* species, and are often observed migrating individually, in pairs, or less frequently in small groups. Fall migration patterns appear to be much different, with more frequent observations of larger groups. Since 2008, we have annually documented large congregations at cultivated lands in southern Alberta in August and September. Total numbers within an area approximately 30 x 100 km have been as high as 179 per single-daily visit, including as many as 60 individuals in a single field. Animated seasonal occurrence maps in eBird suggest the potential for post-breeding dispersal of Swainson's Hawks from western states into southern Alberta in late summer. The concentrations observed in southern Alberta may therefore represent regional staging grounds prior to fall migration. We will present the results of additional surveys to be conducted in fall 2013, to further describe habitat associations, behavior and timing of congregations.

Breeding Biology of Southern Crested Caracaras (*Caracara plancus*) in Santa Cruz Province, Southern Patagonia, Argentina

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The breeding biology of Southern Crested Caracaras is relatively understudied. The scarce reports on this topic are limited to the description of nest-sites and characteristics of nest location. Most information comes from studies conducted in northern and central Argentine provinces. Here we report preliminary results about the breeding biology of Southern Crested Caracaras in southeastern Santa Cruz province, Southern Patagonia, Argentina, between 2009 and 2011. We identified a total of 32 nests of Southern Crested Caracaras over 3 years of intensive searching in an area estimated at 60,000 ha. Of a total of 32 caracaras active nests found, 13 were built on human made structures, such as accessing platforms on telephone, light, natural gas, water tank and radio towers, petroleum drilling machines, and top of telephonic centrals. Other nests were found on the native shrub Magellan barberry (*Berberis buxifolia*- locally named Calafate) ($n = 11$), followed by other native and exotic trees ($n = 5$), and coastal cliffs ($n = 3$). Overall, for the years 2010 and 2011 productivity per active nest with nestlings was 2 nestlings/nest. Productivity was higher for those birds nesting in Calafates (2.3 nestlings/nest; $n = 6$) when compared with those nesting in human-made structures (1.75 nestlings/nest; $n = 8$) in the same period. Additional results of this study are still being analyzed and will be presented during the conference.

Integrated Conservation of Eurasian Black Vulture (*Aegypius monachus*) in South-eastern Portugal



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The Eurasian black vulture is a Critically Endangered species in Portugal that only recently re-colonized the country as a breeding species, currently with five nesting pairs. South-eastern Portugal has no breeding pairs, but is widely used by the breeding population and non-breeding dispersing individuals from neighbouring Spanish colonies. The aim of the LIFE project 'Habitat Lince Abutre' (<http://habitatlinceabutre.lpn.pt>; LIFE08 NAT/P/000227, co-funded by the EU LIFE-Nature programme) is to promote the reestablishment of a breeding population of Eurasian black vulture in the south-eastern Portugal Special Protection Areas of Mourão/Moura/Barrancos and Vale do Guadiana. Following the evaluation of the priority areas for the species in this region, an integrated conservation effort has been put into action by the project, ranging from strategic regional planning and direct work with stakeholders to concrete conservation actions aiming at improving breeding and trophic resources. Currently, a poison mitigation plan and a regional species action plan have been proposed to the national conservation agency. Eleven management agreements have been established with local stakeholders for this species conservation, covering over 10.000 hectares. Within this area, approximately 30 artificial nests have been constructed and a network of 10 feeding stations has been established, supplied with local livestock and big game carcasses whilst safeguarding human and wildlife health issues. Regarding public participation and awareness, the project has locally reached over 2.500 school children and 500 stakeholders, but thousands of people nationwide. The evaluation of changes in public perceptions and attitudes as well as public participation meetings are also being held, aiming at the understanding and engaging of the local society. The project's conservation measures and the existing foraging vultures are being actively monitored. This monitoring has already confirmed the use of the feeding stations by this species and the importance of the region for scavenger birds' conservation.

Age-mediated Spatial Segregation of Swainson's Hawks (*Buteo swainsoni*) in Their Wintering Grounds in Argentina

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Wintering habitat segregation by age is widespread among long distance migrant species. In some cases, older and more experienced individuals would select more suitable sites in wintering areas with those less experienced individuals occupying sub-optimal habitats. The Swainson's Hawks is a long distance migrant raptor that breeds in U.S.A. and Canada and spend the boreal winter in central Argentina. It has been hypothesized that Swainson's Hawks segregate in wintering areas according to their age but evidence supporting this assertion is scarce. In this work we examined the spatial segregation by age of Swainson's Hawks wintering in agricultural landscapes of the Argentine pampas. Age class composition (adult vs. non-adults birds) was examined in 100 flocks (group size > 5 birds) of Swainson's Hawks recorded during extensive surveys conducted in 2002-2004 austral summers. The proportion adult vs. non-adult was examined against land use and habitat variables at two different scales: at local site,



recording habitat variables at a circular 500 m radius around the point where the flock was recorded, and at landscape scale in a 30x30 km plot that includes all the flocks recorded during 70 km surveys and eight point counts conducted at each plot. There was no evidence of complete segregation by age of wintering Swainson's Hawks. Most of the flocks recorded were composed by a mix of adult and non-adult birds at different proportions. At local scale, however, proportion of adults in flocks was positively related with coverage of grasslands and negatively related to cultivated lands. When examined at landscape scale, however, the results were not conclusive. Our results indicate the lack of a complete segregation by age on wintering Swainson's Hawks as it has been previously proposed. Some evidence, however, indicate a subjacent hierarchical mechanism of segregation where adult birds are found in higher proportion in the most favorable wintering habitat for the species.

Life of the Ural Owl (*Strix uralensis*) and Tawny Owl (*Strix aluco*) in a Cyclic Environment: Some Results of a 48-year Study

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This contribution is based on my 48-year conservation project and population study on the Ural Owl (*Strix uralensis*) and Tawny Owl (*Strix aluco*) breeding almost exclusively in nest boxes in southern Finland (61° 24' N, 24° 30' E). Both species are generalist feeders, but their annual reproductive output and survival are highly dependent on a 3–4-year vole cycle. In years of low microtine populations most pairs were not able to lay eggs at all, and the median laying date was up to four weeks later than in peak microtine years. The annual mean clutch size of the Ural Owl varied from two in the worst year to four in the best, and consequently, the minimum total of fledglings produced per year within my study area, was only 12 while the maximum was 540. However, because the vole numbers normally crashed soon after the peak, the average survival and recruitment probabilities of young birds hatched in the peak phase were much lower than those of the young hatched in the low or increase phases. This means that most of the high production of young in top years was “wasted”. Lifetime reproductive output of the Ural Owl females was highly variable: 50% of the fledglings were produced by 23% of the breeding females or 6% of the fledglings of the previous generation. Fidelity both to the nest site and the mate were higher in the Ural Owl than in the Tawny Owl. Depending on the calculation method, the “divorce” rate was 5% or 9% in the Ural Owl and 9% or 15% in the Tawny Owl.

Pan-European Inventory of Raptor Monitoring Schemes in Europe with the Finnish Raptor Monitoring Scheme as an Example

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As top predators, raptors are key species in ecosystems and can be good indicators of the state of wider biodiversity. Raptor monitoring can therefore detect ecosystem change and particular threats, all of which can have significant environmental, social and economic impacts. However, due to specific survey protocols, raptors are often poorly covered by multi-species bird censuses. Raptor monitoring schemes are diverse in nature, rarely centrally coordinated, conducted at different scales, range from academic research to citizen science, and are rarely standardized in approach. Hence there would be great benefit in reinforcing national initiatives, addressing gaps and improving coordination. This applies to monitoring of both the state of raptor populations, and to what raptors can tell us about the environment. EURAPMON, a Research Networking Programme of the European Science Foundation (<http://www.eurapmon.net/>) has initiated an inventory of existing raptor monitoring schemes covering 40 European countries (90%) with 1016 schemes detected so far. The inventory considers a wide range of issues, including breeding and migratory populations, breeding success, environmental parameters, survey and analytical methods (including individual identification techniques) and data applications. Owls are much less monitored than diurnal raptors with the most monitored species being the Golden Eagle (*Aquila chrysaetos*) among diurnal raptors (40 % of the countries) and the Eagle Owl (*Bubo bubo*) among owls (30 % of the countries). Some representative outcomes from the Finnish schemes are presented to illustrate good practice and are contrasted with a range of approaches from across Europe. In Finland, population monitoring of raptors is entirely based on fieldwork by voluntary raptor ringers. Since the early 1970s, annual numbers and productivity of four endangered species have been monitored by country-wide Comprehensive Surveys. Since 1982, data for monitoring the populations of "common" raptors have been gathered by the Raptor Grid and Raptor Questionnaire projects.

Winners and Losers Among Open-habitat Raptors Due to Agricultural Intensification of Argentina Pampas

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The Argentine pampas biome is one of the largest in southern South America and has a great relevance both as breeding areas for some specialized raptors and as wintering areas for Neotropical migratory birds of prey. It is suspected that ample land use changes occurred in Argentine pampas during the last decade (due to conversion of former ranches to industrialized agricultural fields, mainly for soybean implantation) may have led to a decrease of species linked to cattle rearing practices and an increment of more tolerant species. In this study, we compare two extensive surveys done in 2002-3 and 2012-13 with the aim of assess changes in (1) relative abundance and (2) species-habitat relationships in the raptors assemblage during the last decade. Sixty seven 30x30 km squares were surveyed for raptors, each by 7 car transects and 8 observation points. Land-use and habitat descriptive variables were



estimated at the observation points and changes in coverage for this land-use and habitat types were used as predictors of changes in raptor abundance during the same period. A total of 8032 and 6722 raptors were recorded during surveys conducted in 2002 and 2012, respectively. Ten out of 17 raptors species recorded decreased in number, some noticeably (50% reduction), while six increased in number (particularly the *Falco* species) and one (*Geranoaetus melanoleucus*) appeared in 2012 and was not registered in 2002 surveys. Major changes in land use type during this period were due to reduction in coverage of woodlands and lagoons, this last ones probably associated to severe drought conditions in 2011-2012, and increase in the area devoted to crops and urban development. The squares with major changes in land-use and habitat compositions showed the greatest changes in raptor assemblage composition. Our results confirm the vulnerability and susceptibility of birds of prey to the ongoing landscapes changes in Argentine pampas.

American Peregrine Falcon Recovery on the California Channel Islands

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American Peregrine Falcons (*Falco peregrinus anatum*) historically were common residents on all the California Channel Islands, with an estimated nesting population of 15-30 pairs. Peregrine Falcon populations were extirpated from the Channel Islands by the mid-1950s, likely due to DDT contamination around the islands associated with the discharge of at least 1800 metric tons of DDT into the ocean by a DDT manufacturing plant from 1947-1972. Restoration attempts began with the release of 37 peregrines on the Channel Islands between 1983 and 1988. Nesting began in 1987 and the known population steadily grew from nine pairs in 1992 to 25 pairs in 2007. Although the population continues to grow, DDT still was found at elevated levels in addled eggs in 2007 (2.6-57.9 ppm). In 2013, we conducted an intensive survey of all eight Channel Islands using a call-broadcast and passive-monitoring protocol to determine overall productivity and collect data on the potential impact of continued DDT contamination. We located 44 territories with pairs present and nesting occurred on all eight islands. Thirty-three pairs (75%) laid eggs and over 65% successfully hatched at least one chick (av. = 2.7 chicks/successful nest). Peregrine falcons now are successfully breeding on all eight California Channel Islands and productivity is similar to mainland populations. Therefore, although DDT persists in the local environment, productivity and/or immigration appear to be sufficient to maintain a viable population on the Channel Islands.

Population Dynamics and Conservation Status of the Western Burrowing Owl (*Athene cunicularia hypugaea*) in the United States and Canada: A 15-year Update

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The Western Burrowing Owl is a grassland specialist distributed throughout western North America, primarily in open areas in desert, grassland, and shrub-steppe ecosystems. They largely are dependent on the presence of fossorial mammals where burrows are used for nesting and roosting. This owl species has been the focus of much research, monitoring, and conservation efforts since the first indications of population declines in the 1980s. Despite this focus, burrowing owls remain endangered in Canada, threatened in Mexico, and not yet listed but continuing to decline in the United States. I examined the population dynamics of burrowing owls using two major standardized avian counts (BBS, CBC) and reviewed the conservation status of Western Burrowing Owls as I did 15 years ago to assess changes occurring over this time. In the US, burrowing owls are still listed as endangered, threatened, or a species of concern in most western states. BBS data for the US and Canada reveal that the 1966-2011 trend is slightly more than a 1% loss per year. Almost all western US states continue to show declining numbers (0.2-4.9%), with the exception of AZ, NE, NM, and WY. CBC data for the US indicate that relatively few Burrowing Owls are seen on CBCs (0.03-0.05 owls/party hour), limiting its use. Conservation statuses of Western Burrowing Owls across the western US and Canada have really not changed in the past 15 years. The elimination of burrowing mammals through control programs and habitat loss appears to be the primary factor responsible for Burrowing Owl declines. Thus, I suggest that a major way to conserve Western Burrowing Owls is to protect burrowing mammals and their habitats, which should include eliminating control programs and placing real limits on changing land-use for agricultural and other development. Further, conservation statuses of Western Burrowing Owls in the US should be revisited and adjusted to more accurately reflect their continuing declines.

Weather Affects Competitive Ability in a Guild of Soaring Birds

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Area-use in animals is typically examined in relation to the distribution of food and associated habitat variables. For soaring birds this may be only half the story, as the availability of rising air is a key determinant of the ability of these animals to move. We refer to environmentally driven changes in flight costs as the 'energy landscape' and suggest that this has far-reaching implications for soaring birds, influencing the locations and times where they can operate and the circumstances under which given species may enjoy a competitive advantage. We used aeronautical models to examine this in a guild of New World scavenging birds. Results suggest that movement costs vary according to morphology (specifically wing loading) and weather variables, with Andean Condors (*Vultur gryphus*) performing better in strong updrafts and moderate to high winds. Spatial trends in meteorological factors seem to confine condors to the mountains (a trend that is borne out in worldwide distributions of condors and other large soaring birds), where they out-compete smaller species. However, both model predictions and carcass observations suggest the competitive ability of soaring birds varies according to meteorological conditions in areas where distributions overlap. This challenges the view that scavenging guilds are structured by fixed patterns of dominance and suggests that competitive ability varies across spatial and temporal scales, which may ultimately be a mechanism promoting diversity among aerial scavengers.



Golden Eagle Territory Occupancy and Egg Laying Decline in Relation to Fire and Prey Abundance in the West Desert of Utah

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Fire frequency and shrub loss have increased with the spread of invasive cheatgrass (*Bromus tectorum*) throughout the Great Basin and including the West Desert of Utah. Widespread fire in the West Desert in 2007 coincided with a subsequent decline in area Golden Eagle (*Aquila chrysaetos*) territory occupancy and egg laying. Nesting data compiled from 196 local territories revealed territory occupancy and egg laying rates were 38% and 50% lower, respectively, during the period 2008–2012 relative to rates observed during 1998–2007. Additionally, we found that territories experiencing higher long-term occupancy and egg laying rates experienced significantly ($P < 0.05$) fewer fires and contained less burned area and greater shrub cover within 4 km of nests compared to territories with lower rates. Rates did not differ in relation to elevation or region within the study area, suggesting the documented declines were study area-wide in nature. Prey surveys conducted in 2011 and 2012 suggested black-tailed jackrabbit (*Lepus californicus*) abundance was extremely low relative to historic census data compiled for the years 1962–2001 and no rabbits were observed on transects ($n = 128$) in areas with >40% cheatgrass cover. Small mammal abundance and diversity were also significantly reduced in areas of high cheatgrass cover. We also briefly highlight dispersal data from 157 banded nestlings subsequently re-encountered, genetic data from feathers collected at 58 local nests, and survival and movement data from approximately 20 GPS PTT units deployed on area nestlings in 2013. Overall, our results suggest concern is warranted for Golden Eagles in western Utah given sustained declines in breeding activity that appear related to fire, shrub loss, and concomitant prey declines.

Initial Responses of Raptors and Other Birds to Development of a Large Photovoltaic Solar Facility in California

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The California Valley Solar Ranch is a 250 MW solar power plant under construction on 1,900 ha of primarily degraded, largely treeless, grassland habitat in south-central California. To address concern about possible effects of project development on migratory and resident birds, we are conducting monthly avian activity counts throughout the project site and in adjacent control plots. We describe results from the first 13 months of monitoring, from October 2011, when construction began, through October 2012, by which time two of nine discrete solar arrays were energized and producing power, and six others were under construction. To describe variation in activity rates (sightings per 20-minute count within 800-m sampling radii), we fit negative-binomial general linear models to data for raptors, ravens (*Corvus corax*), and other smaller birds (primarily larks, finches, starlings, blackbirds, and sparrows). Explanatory variables included Season (Winter, Spring, Summer, Fall), Locale (OF = 4 off-site control



plots, GT = 2 transmission-line sites, and SGF = 8 Solar Generation Facility sites), Site (count sites nested within Locales), Status (monthly indicator of GT/SGF sites being in a pre-construction or construction state), and interaction terms. We recorded 48 species, including 10 raptors. Several species, including common raptors, took advantage of new perch substrates, and we recorded 13 species, but no raptors, using developed solar arrays. With seasonal variation accounted for, the onset of project construction reduced overall raptor activity in the SGF, with progressive reductions as specific areas moved from pre-construction to construction. Within the GT corridor, however, installing new towers and lines (used for perching) had a slight positive effect on raptor activity. In comparison, construction had a significant negative effect on raven activity only during the initial winter period, with positive responses in some SGF construction areas, and sighting rates for the other birds group typically were comparable or higher within on-site construction areas compared to both OF and on-site pre-construction areas.

Raptors and Introduced Species: An Ambiguous Relationship and Needs for Research

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Biological invasions are considered one of the major threats to the Earth's biota, and their prevention and control are widely recommended. A critical step is to obtain scientific information on the effects produced by introduced species. In the case of raptors, the effects of non-natives are particularly worrisome given their high trophic positions and their ecological role through which they can structure native communities. Here we base on a paper we recently published in which we reviewed the published literature on the effects of introduced species on raptors and go further by updating the information and focusing on studies working on this relationship. Our results highlight important negative effects such as decrease in native prey and poisoning aiming to protect productive non-native species. But also we show that many non-natives have become key components of existing ecosystems with native species depending on them. This must be seriously considered when designing control plans for introduced species. Despite these important effects, we found few articles with the aim of studying the relationship between raptors and non-native species. We consider it is very important to fill this knowledge gap by designing specific studies in the future, particularly taking into account that increased globalization would lead to an increase in non-native species introductions which will probably augment the effect on raptors species. Therefore, in this presentation we will give several examples of the relationship between non-natives and raptors, and we will suggest possible approaches to address this issue.

Plumage, Plastic, and Polygny: Using Color Banding and DNA Tests to Unravel American Kestrel Breeding Strategies

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During the 2009 breeding season, behavioral observations indicated that an American Kestrel (*Falco sparverius*) male in semi-rural Eldorado at Santa Fe, Santa Fe County, New Mexico, U.S.A., fathered broods with two different females in nest boxes 300 m apart. Individual marking of breeding adults between 2010 and 2012 produced more concrete observational evidence of polygyny in 2011. Courtship of secondary females occurred during incubation of the primary clutch, so that secondary females initiated incubation 4-5 weeks later than primary females. Feather samples were collected from all nestlings in the two boxes between 2009 and 2012, and from two adult males and four adult females involved in breeding efforts at the two nest boxes over the same period. Using polymorphic microsatellite markers, likelihood analysis was used to assign parentage for each of the sampled nestlings. Parent/offspring pairings confirmed the polygyny observed in 2011, but not the initial polygyny observed in 2009, at least not by the male marked in January 2010 that was polygynous in 2011. The lateness of a 2012 brood suggested polygyny by the second marked male and two successive years of one marked female accepting the secondary female role. The occurrence of polygyny was perhaps enhanced by visually different females and the lower quality of the nest box used by both secondary females.

Public Information and Ectoparasite Avoidance in the Settlement Decision of the Eurasian Kestrel (*Falco tinnunculus*)

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Animals constantly need to acquire information about the environment for settlement decisions, either by using a trial-and-error strategy or by using public information by monitoring conspecifics. We used a nest-box population of Eurasian kestrels in western Finland to carry out an experimental approach (2003-2012, between 62-181 nest-boxes available and randomly cleaned in each study year) of the hypothesis on the use of prey remains as public information in settlement decisions. It is possible that kestrels reuse un-cleaned nest-boxes (control group) because they indicate previous breeding success on the site. At the same time the decision may entail related costs because of blood-sucking ectoparasites like *Carnus hemapterus*. First, we calculated mixed models showing that prey remains left inside the nest-boxes were significantly advancing the egg-laying date, indicating the use of public information in the settlement decision. Additionally, partners of +2-year old males started egg-laying earlier than those of yearling males indicating a crucial role of male age since the male provides food to the female during courtship and egg-laying period. The smaller clutches found in cleaned nest-boxes (experimental group) were most likely an effect of the later egg-laying date. Second, the ectoparasite burden of nestlings was significantly higher in un-cleaned control broods, without however obviously influencing breeding success. Third, we could confirm one prediction of the tasty chick hypothesis. The last-hatched chicks showed significantly higher ectoparasite infestation rates than their senior siblings, but did not have an effect on average body condition or nest-failure. In conclusion, the use of prey remains as public information as a sign of successful previous breeding attempt in the nest-site appeared to be important in the settlement decision of breeding kestrels, since individuals started egg-laying earlier in un-cleaned control nest-boxes. On the other hand, we found no strong evidence for nest-box reuse being advantageous.



Breeding System and Ecology of the African Pygmy Falcon: Initial Insights

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The African Pygmy Falcon (*Polihierax semitorquatus*) depends on weaver structures for nesting. In Southern Africa this species breeds exclusively in massive Sociable Weaver (*Philetairus socius*) colonies. Yet despite the conspicuousness of this system, the falcon remains largely unstudied. I initiated a study to investigate the breeding system and demography of a Pygmy Falcon population in the Kalahari of the Northern Cape, South Africa. My 100 km² study area hosts over 200 sociable weaver colonies; falcons occupy about 14% of colonies each season. Approximately 35% of weaver colonies show signs of past falcon occupation. Falcons showed a significant preference for nesting in large weaver colonies, but did not show a preference for tree species. I followed falcon breeding in 25 (2011) and 28 (2012) territories and ringed individuals. Falcon territories were small with average nearest neighbouring nests 1 km (range 0.5–2.2 km). Of 46 confirmed breeding attempts, clutch size averaged 2.7 (range 2–3 eggs). Eight breeding attempts failed due to nest predation (one confirmed by Cape Cobra *Naja nivea*) and adult mortality (predation by larger raptors and getting trapped in nest chambers). On average 2.4 chicks fledged from successful nests (range 1–3). In all territories with active nesting attempts, nine occasions (20%) of an adult female with two or more males were found. In 2012 with known individuals controlled, nests with multiple males were mainly found to include sons from the previous season. But daughters and young males from neighbouring colonies were also found to accompany the assumed main pair. Delayed dispersal and possible cooperative breeding seems likely. Some first year birds did establish new territories and attempt breeding. Only 35% breeding pairs remained the same between the two seasons. Possible simultaneous polyandry in adjoining territories was also found. The breeding system in this species still holds secrets.

The Illegal Persecution of Raptors in Scotland

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Scotland has a long history of raptor persecution dating back to the 15th Century. Legal persecution was particularly prominent during the late 1800s, coinciding with the popularity of driven grouse shooting. During this period, raptors were considered to be 'vermin' and a threat to the survival of game birds reared for sport shooting on private estates. As a result, many raptors were systematically eradicated with catastrophic population-level effects. By the early 1900s, several species had become extinct in Scotland, including the White-tailed Eagle (*Haliaeetus albicilla*), Goshawk (*Accipiter gentilis*), Red Kite (*Milvus milvus*) and Osprey (*Pandion haliaetus*). Other species managed to avoid extinction but suffered severe range contraction as a direct result of persecution, including the Hen Harrier (*Circus cyaneus*), Peregrine Falcon (*Falco peregrinus*), Eurasian Buzzard (*Buteo buteo*) and Golden Eagle (*Aquila chrysaetos*). Legal protection for raptors was first introduced in 1954, following a change in society's perception of birds of prey. Several raptor re-introduction projects continue to aid the recovery of some species such as the White-tailed Eagle and the Red Kite, along with further national and international legislation designed to prevent raptor persecution. However, such legal protection is only effective if it is properly policed and enforced with adequate resources. Multiple studies demonstrate that illegal raptor



persecution is still widespread in Scotland and that it occurs disproportionately on land managed for driven grouse shooting, constraining the populations of several raptor species including Golden Eagle, Hen Harrier and Red Kite. It has been recognized that many problems still exist with the investigation, prosecution and sentencing of those involved, even though solutions are readily available.

Breeding and Mortality Records of Andean Condors (*Vultur gryphus*) in Ecuador

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North temperate land birds reproduce between May and July when high food availability and temperatures favor reproduction. The Andean Condor in the temperate zone of the Southern Hemisphere (Argentina and Chile) incubates eggs between October and December. The Condors in Ecuador, estimated at <100 individuals, inhabit tropical Andean habitats at the equator. We investigated whether the equatorial population follows the reproductive seasonality of southern populations, or timing more typical of tropical species breeding year-round. We collected all known and reliable nesting records from 1996, when the first nest was located in the wild, through June 2013. Hatch dates were precisely recorded for captive pairs and estimated for wild pairs. Hatching took place in January ($n = 2$), February ($n = 1$), May ($n = 2$), June ($n = 1$), July ($n = 1$), August ($n = 1$), September ($n = 2$), October ($n = 3$), November ($n = 1$) and December ($n = 2$). The most productive captive breeding pair hatched eggs in December (2002), August (2006), May (2010), and September (2012) and laid two infertile eggs whose hatch dates, if eggs had been fertile, were estimated in November (2008) and January (2009). We conclude that the Andean Condor in Ecuador can reproduce year-round. If productivity outnumbers deaths, the population increases, thus we also compiled mortality records between 1987 and June 2013. Twenty three wild condors were killed (3 from shooting, 2 from poisoning, 1 from a car collision, and 17 from unknown causes). Sixteen additional wild condors were injured and x-ray examinations revealed 1-59 lead pellets per individual in seven (44%) individuals now in captivity. These records are being used to launch an environmental education campaign to mitigate or eliminate human persecution, and to implement management measures to restore this critically endangered population.

Ten Years after Discovery of Diclofenac: Is the Asian Vulture Crisis over?

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In 2003, The Peregrine Fund identified the veterinary drug diclofenac sodium as the cause of the catastrophic collapse of three species of *Gyps* vulture populations in South Asia. Vultures that consumed livestock carcasses contaminated with residues of diclofenac died of renal failure at rates so high that their populations declined by >30% per year. In February 2004, a high-level summit meeting was held in



Kathmandu, Nepal to disseminate results to government authorities from Pakistan, India and Nepal. By 2006, these governments had banned the veterinary use and manufacture of diclofenac. We present encouraging results from our pre-ban and post-ban vulture population monitoring in India, Nepal and Pakistan that suggests that *Gyps* vulture populations may have started to stabilize and at some sites may even be increasing. We emphasize the need for continued work to restore vulture populations, especially *Gyps tenuirostris*, continued vulture population monitoring, and public awareness, especially on the emergence of new non-steroidal anti-inflammatory drugs (NSAIDs) in the veterinary market that could potentially jeopardize vulture conservation efforts in the region.

Home Range and Resource Use of GPS-monitored Ferruginous Hawks (*Buteo regalis*) in Response to Changes in Energy-Development Infrastructure

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In southern Canada the nesting population of Ferruginous Hawks has declined steadily throughout the past half century. Consequently, in 1980, the hawk was listed as threatened in Canada and in 2006, endangered in Alberta. Historically, loss of native prairie to agriculture is thought to have caused much of this decline. More recently, remaining habitat has been impacted heavily by industrial development. We investigated industrial impacts by examining changes in adult Ferruginous Hawk movements over time and space in relation to industrial activity (e.g., roads, oil and gas wells, and transmission lines). Satellite telemetry provides data from multiple breeding seasons for individual hawks, allowing us to make comparisons before and after installation of transmission lines in our study area. In 2012, we captured and telemetered 7 hawks with GPS satellite transmitters (+/- 18 m accuracy). Home ranges were estimated using GPS fixes collected prior to infrastructure construction and 50% and 95% Brownian Bridge Movement Models ($\bar{x} = 1.91 \text{ km}^2$, $SD = 1.03$ and $\bar{x} = 16.29 \text{ km}^2$, $SD = 14.64$). Home ranges are comparatively small relative to other studies, potentially a consequence of high Richardson's ground squirrel (*Urocitellus richardsonii*) abundance and/or high hawk densities. Preliminary analyses of nest sites with newly constructed transmission towers show high intensity perch use of the new towers and no avoidance. Resource selection functions allow us to determine selection or avoidance of landscape features (e.g., native prairie, non-native grassland, and cropland) and will indicate if hawks select or avoid anthropogenic features (e.g., roads, oil and gas wells, and transmission lines). Results from our study provide researchers and industry with critical information regarding how hawks use their environment. In 2013 we are attempting to capture 20 additional hawks, along environmental gradients that range from low to high proportions of cropland, oil and gas infrastructure, roads, and transmission lines.

Experimental Restoration of the Harpy Eagle



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Harpy Eagle (*Harpia harpyja*) populations are negatively impacted by loss of forest habitat and human persecution. Species restoration becomes the tool of choice to return populations to viable numbers when numbers are depleted from areas of otherwise suitable habitat. From 1987 through 2006, 17 Harpy Eagles participated in a captive breeding program first started in Boise, Idaho and then continued in Panama from 2001. From 131 eggs laid, 44 eagles were fledged. Most were produced by just three females, and most were produced after the birds were moved from Boise to Panama. Recycling by collecting eggs for artificial incubation increased the number of viable eggs laid per female each breeding season up to six. Including rehabilitated wild eagles, we released 49 eagles into the wild from 1998 through 2009 using a two stage process of soft release where birds were tracked and fed for up to 30 months, followed by relocation and hard release in their final destination. The soft release period was shorter and survival to independence higher in birds soft released at an age closer to normal independence age, around 20 months after hatch. When the last bird with a functioning radio transmitter died in 2011, 31 (63%) eagles were known or presumed to be dead, 15 (31%) were missing and possibly alive, and 3 (6%) were back in captivity. Shooting (44%) was the single largest known cause of death. This project demonstrated that it is feasible to breed Harpy Eagles in captivity at high rates, especially in their natural environment with sun, warmth, and moisture, and to release them into the wild, with high survival to age of independence if eagles are released at around 20 months. Preventing shooting and other kinds of persecution, and protecting remaining forest habitat, are the most urgent conservation needs for the Harpy Eagle.

The Batumi Bottleneck – Massive Scale Migration of Birds of Prey along the Eastern Black Sea Coast, Republic of Georgia

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Counts of migrating raptors at Batumi, Republic of Georgia, revealed the eastern Black Sea coast to form one of the most important bottlenecks for raptor migration during autumn in the Eurasian–African migration system. Since the start, the survey team has conducted a simultaneous count on two stations to monitor the autumn migration across the 12km narrow convergence zone. Within five years the monitoring program revealed a maximum yearly passage of 1.011.747 birds of prey in 2012 with the majority of European Honey Buzzard (*Pernis apivorus*) (64 %; max. daily passage rate 172.000), Steppe Buzzard (*Buteo buteo vulpinus*) (19,7 %) and Black Kite (*Milvus migrans*) (10,8 %). The autumn totals (2008-2012) for 10 of 36 species (Black Kite, Lesser Spotted Eagle (*Aquila pomarina*), Montagu's Harrier (*Circus pygargus*), Greater Spotted Eagle (*Aquila clanga*), Steppe Eagle (*Aquila nipalensis*), Steppe Buzzard, Levant Sparrowhawk (*Accipiter brevipes*); noticeable: 48-136% European Honey Buzzard, 5-54% Booted Eagle (*Aquila pennata*), 4-7% Pallid Harrier (*Circus macrourus*)) exceeded over 1% of their estimated world population. Against the general opinion of harriers as broad front migrants the numbers in Batumi show large concentration of three harrier species (Average per autumn: Montagu's



Harrier 6126, Pallid Harrier 1289, Western Marsh Harrier (*Circus aeruginosus*) 4782). Reasons have been hypothesized and are object of further analyses. The major threat of migrants is the massive local hunting pressure formed by tradition, poverty and social life. The local survey team (batumiraptorcount.org) faces the threats with environmental education programs at schools and in public, generates alternative income through sustainable tourism, conducts further research for assessing the impact of hunting pressure on migrants, and expands the activities to agglomeration sites of passerines and waders along the coast where hunting constitutes the main threat among the expansion of local infrastructures.

West Nile Virus (*Flavivirus*, *Flaviviridae*) Activity in Andean Condors and Crowned Eagles from Argentina

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The West Nile virus (WNV) has recently showed an emerging process through the American continent becoming a pathogen of concern for free range birds populations. Avian epizootic events were not reported in American countries other than the U.S.A. Unfortunately, the role of WNV as pathogen for free ranging birds is unknown for other countries except the U.S.A., mainly due to the absence of active surveillance systems. In Argentina, it has received little attention from ornithologists and conservations actors and its ecoepidemiology is almost unknown. The aim of this research was to evaluate the serological status against WNV in two threatened species: Andean Condor (*Vulthur gryphus*) and Crowned Solitary Eagles (*Harpyhalietus coronatus*). WNV neutralizing antibodies seroprevalence was estimated in 22% (9/41) for analyzed Andean Condors, and 38% (5/13) for Crowned Solitary Eagles. All birds resulted negative when tested against St. Louis encephalitis virus, a flavivirus closely related to WNV. Our positive results include Andean condors from Catamarca, Buenos Aires and Río Negro provinces. As the only previous survey for southern Patagonia did not detect WNV antibodies in birds from Santa Cruz province, we consider our positive Condor tested in Río Negro province (nearby San Carlos de Bariloche City) as the most southern register of WNV activity in Argentina. These findings indicate ecological conditions favorable for WNV maintenance are still present in northern Patagonia. Positive Crowned Solitary Eagles came from San Juan, San Luis, Mendoza and La Pampa provinces expanding previous findings in the geographical range of WNV exposure for this endangered eagle. Considering particular feeding habits for studied species, the high infection prevalence could be related to vector transmission and/or infected prey ingestion. Future investigations should be driven to know how natural exposition to WNV is affecting fitness of these raptors populations.



Distribution and Ecology of the Sparrowhawk (*Accipiter nisus*) in Poland

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Research on Sparrowhawks was conducted at 11 areas in central and eastern Poland from 2002 through 2008. Five areas were located in the forest habitat and six were situated in farmland-woodland habitat. In both habitats nests were located mainly in 30-50 years old coniferous forests. Forest Stand Preference Factor (FSPF) for those stands was over 3.5 (FSPF >1 indicate preference). Breeding success and juvenile production were significantly higher in farmland due to the lower predation pressure by Pine Martens (*Martes martes*), but there were no differences by habitat in other breeding parameters. Rather, clutch size and juvenile production were influenced by food availability. The main prey in farmland was Barn Swallows (*Hirundo rustica*) and Skylarks (*Alauda arvensis*). Forests breeders prey were mainly tits and woodpeckers (*Paridae* and *Picidae* species, respectively). The distance from nest to forest boundary had an impact on diet composition. The correlation between forest species in food and distance from the nearest forest boundary was 0.96. The same correlation measured for synanthropic species and distance from nest to the nearest village was -0.86. Thus, we discovered a correlation between the population of sparrowhawks and the percentage of forest cover. We use this correlation to compare our data to previously published research from over 20 study plots, and we conclude the population of sparrowhawk in Poland is about 31 000 breeding pairs. This is significantly higher number than in recent publications.

Effects of Wind Energy Development on Nesting Ferruginous Hawks (*Buteo regalis*), Golden Eagles (*Aquila chrysaetos*), and Bald Eagles (*Haliaeetus leucocephalus*) in an area of South-central Wyoming

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Certain raptor species are good indicators of overall environmental health, and may be impacted by increased human activities such as expanding energy facilities construction and operation. Wind energy development may impact raptor species directly (turbine collisions) or indirectly (habitat loss, displacement, or avoidance). However, the lack of information, and multiyear studies in particular, make it difficult to draw general conclusions about the effect of wind energy related fatalities. In collaboration with the Wyoming Game and Fish Department, WEST, Inc. studied potential changes in species composition, number, and productivity of nesting Ferruginous Hawks, Golden Eagles, and Bald Eagles in an area of south-central Wyoming U.S.A. Our objective was to assess potential changes in species composition, number, and productivity of nesting raptors in an area with increasing levels of wind energy development. To achieve this, we: 1) identified nest site occupancy and success, 2) conducted productivity counts, 3) calculated nest density and distance to nearest wind energy facility, and 4) compared raptor population demographics with nest distributions relative to the progression of wind



energy development over a 31-yr period. Using intensive aerial and ground monitoring techniques, we found that Golden Eagles were the only focal raptor species to show decreases in nest occupancy and production through the study period. However, this is consistent with trends across the western U.S., and may not be related to wind development. Conversely, Bald Eagle nesting and productivity increased, following the range-wide and Wyoming trends for this species. Nesting Ferruginous Hawks numbers increased during the study period. Productivity per occupied and successful Ferruginous Hawk nest was reduced during the late portion of the study, but the decline was not statistically significant. Overall, no large apparent effects in the nest occupancy and production were observed in the overall study areas or adjacent to wind projects.

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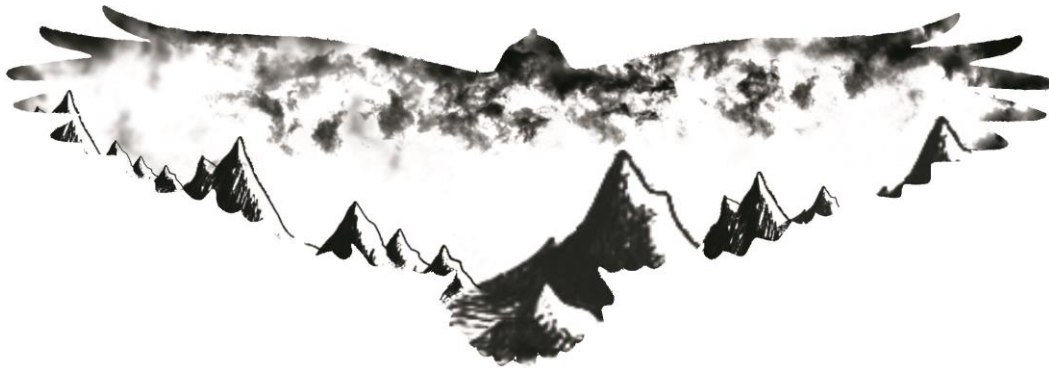
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