ASIAN RAPTORS

Science and Conservation for Present and Future

Proceedings of the 6 th International Conference on Asian Raptors

23-27 June 2010 Ulaanbaatar, Mongolia

Asian Raptor Research and Conservation Network
Mongolian Ornithological Society
National University of Mongolia

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Science and Conservation for Present and Future

Supported and cooperated by:

Asian Research and Conservation Network

Mongolian Ornithological Society

National University of Mongolia

Ministry of Nature, Environment and Tourism

Mongolian Academy of Science

The 6 th International Conference on Asian Raptors
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DDC 598.9’5’015
A- 84

Editors: **Gombobaatar Sundev, Rick Watson, Marta Curti, Reuven Yosef, Eugene Potapov, Martin Gilbert**

Cover photograph credits:
Gombobaatar Sundev and Mongolian Ornithological Society

Production edition and cover design **Gombobaatar Sundev and Amartuvshin Purevdorj**

Suggested citation:
Gombobaatar Sundev, Rick Watson, Marta Curti, Reuven Yosef, Eugene Potapov, Martin Gilbert (eds) 2010. The proceedings of the International 6th Conference on Asian raptors. Ulaanbaatar, Mongolia.

Conference halls of the Chinggis Khaan hotel complex and Hustai Nuruu National Park, Mongolia
23-27 June, 2010

Printed in Admon Publishing Company, Ulaanbaatar, Mongolia

ISBN 978-99962-0-174-5

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Acknowledgements

- All members of the Mongolian Ornithological Society
- Faculty of Biology, National Univeristy of Mongolia
- Board members of the Oriental Nomads LLC
- Steppe Forward Programme
- Asian Raptor Research and Conservation Network
- Ministry of Nature, Environment and Tourism
- The Peregrine Fund
- National University of Mongolia
- Mongolian Academy of Sciences
- Hustai Nuruu National Park
- Mr. Henry Brown
- Mr. Valentin Schatz

Conference and Scientific Programme

Day 1: 23 June, 2010 (Wednesday)

TIME	PROGRAMME	VENUE
15:00-18:30	Registration	Flower Hotel
10:00-13:30	Raptor watch near Ulaanbaatar city by the Mongolian Ornithological Society for early arrivals	Restaurant area
19:30	Welcome Dinner and Opening Ceremony	Chinggis Khaan hotel restaurant

Day 2: 24 June 2010 (Thursday)

TIME	PROGRAMME	VENUE
08:00-08:15	Welcome speech by Mr. Toru Yamazaki, President ARRCN	Chinggis Conference Hall
08:16-08:30	Welcome speech by Mr Ch.Jargalsaikhan Vice minister, Ministry of Nature, Environment and Tourism, Mongolia	
08:31-08:45	Welcome speech by Prof. D.Sumiya National University of Mongolia	
Session I: Representative presentations from each country ***Chairpersons: Prof. Reuven Yosef and Dr S. Gombobaatar***		
08:45-09:03	ECOLOGY & CONSERVATION OF THE GREY-HEADED FISH EAGLE (*Ichthyophaga ichthyaetus*) AT TONLE SAP LAKE, CAMBODIA **Ruth Tingay, Malcolm Nicoll, Sun Visal**	Chinggis Conference Hall
09:03-09:21	THE DIET OF INDIAN EAGLE OWL AND ITS AGRONOMIC SIGNIFICANCE IN THE INDIAN SCENARIO **Satish Pande**	
09:21-09:39	CURRENT STATUS OF DIURNAL RAPTORS IN INDONESIA AND THEIR CONSERVATION CHALLENGES **Adam Supriatna**	
09:40-10:08	CURRENT STATUS AND DISTRIBUTION OF DIURNAL RAPTORS IN MALAYSIA **Lim Kim Chye**	
10:09-10:27	SOURCE-SINK POPULATIONS OF THE STELLER'S SEA EAGLES (*Haliaetus pelagicus*) IN THE NORTHERN PART OF THE SEA OF OKHOTSK: ECOLOGICAL TRAPS AND THEIR CONSERVATION IMPLICATION **Potapov Eugene, Utekhina Irina, McGrady Mike, David Rimlinger**	
10:30-11:00	*Coffee Break / Poster viewing*	Poster Area

Session I: Representative presentations from each country ***Chairpersons: Dr Eugene Potapov and Dr Satish Pande***		
11:01-11:19	BREEDING ECOLOGY OF THE STEPPE EAGLE *Aquila nipalensis* IN MONGOLIA **Gombobaatar Sundev, Reuven Yosef, Odkhuu Birazana, Sumiya Damdin**	Chinggis Conference Hall
11:20-11:38	OVERVIEW OF RAPTOR MIGRATION IN SINGAPORE FROM THREE YEARS OF OBSERVATIONS (2007-2010) **Alan OwYong, Kenneth Kee, Tan Gim Cheong**	
WORKSHOP 1: RAPTOR POPULATION ECOLOGY AND DATA MANAGEMENT		
11:40-12:10	STUDYING POPULATION ECOLOGY: ASSESSMENT OF PRODUCTIVITY AND SURVIVAL **Ian Newton**	Chinggis Conference Hall
12:11-12:40	THE RAPTOR LITERATURE IN THE 21ST CENTURY **Lloyd F. Kiff**	
12:50-13:50	*Lunch*	Chinggis Restaurant
Session I: Representative presentations from each country ***Chairpersons: Prof. Lee San Don and Lloyd F. Kiff***		
13:50-14:08	TERRITORY SIZE OF BREEDING CHINESE SPARROWHAWKS (*Accipiter soloensis*) IN KOREA **Chang-Yong Choi and Hyun-Young Nam**	Chinggis Conference Hall
14:09-14:27	THE DIET OF CRESTED GOSHAWK (*Accipiter trivergatus*) IN MOSAIC FOREST LANDSCAPE AND DIET SEGREGATION IN CONGENERIC SPECIES **Kuang-Ying Huang, Lucia Liu Severinghaus, Yao-Sung Lin**	
14:28-14:46	BIOMETRICS AND POST-RELEASE TRACKING OF REHABILITATED HIMALAYAN GRIFFON VULTURES IN THAILAND: 2007 – 2010 **Chaiyan Kasorndorkbua, Duangrat Pothieng, Kovit Santajit, Benchapol Lawsunyaluck, Gawin Chutima, Worawidh Wajjwalku**	
14:47-15:05	RAPTOR MIGRATION AT CUC PHUONG AND XUAN THUY NATIONAL PARKS, NORTHERN VIETNAM **Le Manh Hung**	
15:05-15:30	*Coffee Break / Poster viewing*	Poster Area

WORKSHOP 2: RAPTOR COUNTS AND POPULATION		
15:30-16:00	MIGRATION-WATCHSITE COUNTS **Keith L. Bildstein**	Chinggis Conference Hall
16:00-16:30	ROADSIDE SURVEYS **Keith L. Bildstein**	
WORKSHOP 3: RAPTOR MORTALITY AND CONSERVATION		
16:31-17:00	INVESTIGATION OF RAPTOR MORBIDITY AND MORTALITY: INTERPRETING FINDINGS ON INDIVIDUAL AND POPULATION SCALES **Martin Gilbert**	Chinggis Conference Hall
17:00-17:30	CRITICAL ELEMENTS FOR EFFECTIVE RAPTOR CONSERVATION **Rick Watson**	
17:30-19:00	**Drive to Hustai Nuruu National Park**	
19:30-20:30	Dinner	
20:30-21:30	Slide show "Birds of Mongolia in different natural zones and habitats" by the Mongolian Ornithological Society	

Day 3: 25 June, 2010 (Friday)

Session IIA: Taxonomy, status and distribution ***Chairpersons: Prof. Ian Newton and Toru Yamazaki***		
08:00-08:18	POPULATION FLUCTUATION AND STATUS OF WINTERING ON CINEREOUS VULTURES (*Aegypius monachus*) IN KOREA **Seon-Deok Jin, Jae-Pyoung Yu, In-Hwan Paik, Byung-Sun Chun, Hansoo Lee, Woon-Kee Paek**	Hustai Conference Hall-1
08:20-08:38	LARGE FALCONS OF THE SOUTHERN BAIKAL AND THE UPPER ANGARA RIVER **Mel'nikov Yuriy Ivanovich**	
08:40-08:58	SEX IDENTIFICATION OF FIVE RAPTOR SPECIES IN THAILAND BY PCR **Jiranan Insee, Benchapol Lawsunyaluck, Duangrat Pothieng, Chaiyan Kasorndorkbua, Worawidh Wajjwalku**	
09:00-09:18	DISTRIBUTION AND ABUNDANCE OF WINTERING RAPTORS IN THE KOREAN PENINSULA **Lee San Don and Sonor Altjin**	
09:20-09:38	THE STATUS AND DISTRIBUTION OF PALLAS'S FISH EAGLE IN MONGOLIA **Batmunkh Davaasuren, Martin Gilbert, Gombobaatar Sundev**	
09:40-09:58	THE SAKER FALCON IN THE RUSSIAN PART OF ALTAI-SAYAN REGION: STUDY RESULTS OF POPULATION STATUS **Elvira G. Nikolenko and Igor Karyakin**	
10:00-10:30	*Coffee Break / Poster viewing*	Poster Area

Session IIB: Taxonomy, status, distribution and breeding biology ***Chairpersons: Dr Jalila A. and Dr Ruth Tingay***		
08:00-08:18	GOLDEN EAGLE IN THE ALTAI-SAYAN REGION, RUSSIA **Igor Karyakin**	Hustai Conference Hall-2
08:20-08:38	RAPTORS OF KARAIVETTI BIRD SANCTUARY: AN IBA SITE IN TAMILNADU, INDIA **Relton, A., Daisy, A., Carlton, R.**	
08:40-08:58	SIBLING COMPETITION INDUCES STRESS INDEPENDENT OF NUTRITIONAL STATUS IN BROODS OF UPLAND BUZZARDS **Reuven Yosef, Sundev Gombobaatar, Gary Bortolotti**	
09:00-09:18	NEST-SITE SELECTION OF CRESTED SERPENT EAGLE *Spilornis cheela* IN KOLLI HILLS, TAMILNAU, INDIA **Gokula V**.	
09:20-09:38	DISTRIBUTION AND BREEDING BIOLOGY OF THE HOBBY (*Falco subbuteo* L., 1758) IN THE SOUTHERN AND SOUTH-EASTERN GOBI DESERT OF MONGOLIA **Stubbe Michael, Stubbe Annegret, Batsaikhan Nyamsuren**	
09:40-09:58	COMPARISON OF SAKER FALCON *(Falco cherrug)* PRODUCTIVITY AT ARTIFICIAL NEST AREAS AND NATURAL MOUNTAINOUS AREAS IN CENTRAL MONGOLIA **Gankhuyag Purev-Ochir, Andrew Dixon, Nyambayar Batbayar, Amarsaikhan Saruul**	
10:00-10:30	*Coffee Break / Poster viewing*	Poster Area

Session IIIA: Movement and Migration ***Chairpersons: Prof. B.U.Meyburg and Dr Keith L. Bildstein***		
10:31-10:49	RAPID ADVANCES IN THE SPRING PASSAGE MIGRATION TIMING OF THE STEPPE EAGLE *Aquila nipalensis*, THROUGH ISRAEL **Reuven Yosef, Henk Smit, Piotr Zduniak, Tim H. Sparks, Piotr Tryjanowski**	
10:50-11:08	HABITAT USE OF JAVAN HAWK-EAGLE (*Spizaetus bartelsi*) IN HALIMUN–SALAK CORRIDOR AREA, GUNUNG HALIMUN SALAK NATIONAL PARK, INDONESIA **Bambang Supriyanto, Sri Mulyati, Ika K. Widyaningrum**	
11:10-11:28	SPRING RAPTOR MIGRATION IN THE SOUTH BAIKAL MIGRATORY PASS (BURYATIA AND IRKUTSK REGION, RUSSIA) **Alexander Povarintsev, Igor Fefelov, and Timur Dubrovsky**	Hustai Conference Hall-1
11:30-11:48	MOVEMENT PATTERNS OF BREEDING CINEREOUS VULTURES *(Aegypius monachus)* IN IKH NART NATURE RESERVE, MONGOLIA **Mary Jo Willis, Richard P. Reading, David Kenny, John Azua, Travis Garrett, Purevsuren Tsolmonjav**	
11:50-12:08	EFFECTS OF COLD FRONT PASSAGE ON MIGRANT RAPTORS AT SHIRAKABA PASS, NAGANO PREFECTURE, JAPAN, AUTUMN 2000–2009 **Marla L. Steele And Timothy J. O'connell**	
12:10-13:00	*Poster viewing*	Poster Area
13:00-14:00	*Lunch*	Hustai restaurant

Session IIIA: Movement and Migration ***Chairpersons: Dr Todd Katzner and Dr Lucia Liu Severinghaus***		
10:31-10:49	THE AMUR FALCON (*Falco amurensis*) SATELLITE TRACKING PROJECT **Bernd-U. Meyburg, Paul Howey, Zephné Bernitz, Rina Pretorius, Christiane Meyburg**	Hustai Conference Hall-2
10:50-11:08	SPATIAL AND TEMPORAL PECULIARITIES OF RAPTOR MIGRATION IN THE SOUTH BAIKAL MIGRATORY PASS **Igor Fefelov, Marina Alexeyenko, Victoria Malysheva, Alexander Povarintsev**	
11:10-11:28	2008 AUTUMN RAPTOR MIGRATION AT RADAR HILL, PRACHUAP KHIRI KHAN, THAILAND **Chatuphon Sawasdee and Chaiyan Kasorndorkbua**	
11:30-11:48	SOME ASPECTS OF SPRING RAPTOR MIGRATION AT TANJUNG TUAN, MALAYSIA **Lim Aun Tiah and Nina Cheung**	
11:50-13:00	*Poster viewing*	Poster Area
13:00-14:00	*Lunch*	Hustai restaurant

Session IYA: Population threats and Conservation ***Chairpersons: Dr Rick Watson and Lim Kim Chye***		
14:00-14:18	RAPTORS OF NAGPUR CITY IN VIDARBHA REGION OF MAHARASHTRA STATE, INDIA **Raju Kasambe and Pravin Charde**	Hustai Conference Hall-1
14:20-14:38	A REVIEW OF RECENT KNOWLEDGE OF DIURNAL RAPTOR SPECIES IN SUMATRA: A FIRST STEP TO CREATE A LONG-TERM MONITORING PROGRAM TO SAVE TROPICAL FORESTS IN SUMATRA, INDONESIA **Muhammad Iqbal Adam A. Supriatna, Agus A. Nurza**	
14:40-14:58	CONSERVATION THROUGH SUSTAINABLE USE – A PROMISING WAY TO SAVE SAKER FALCON *(Falco cherrug)* POPULATIONS **Nyambayar Batbayar, Andrew Dixon, Nick Fox, Gankhuyag Purev-Ochir, Amarsaikhan Saruul**	
15:00-15:18	ILLEGAL HUNTING OF MOUNTAIN HAWK-EAGLES IN SOUTHERN TAIWAN **Yuan-Hsun Sun, Yung-Kun Huang, Fang-Ru Lee**	
15:20-15:38	EFFECT OF RAT BAITING ON RANGING BEHAVIOR OF BARN OWL (*Tyto alba javanica* Gmelin) IN MALAYSIA **Mohamed Naim., Hafidzi M.N., Azhar, K., Jalila, A., Zubaid Akbar, M.A**	
15:40-15:58	OWL PREDATORY BEHAVIOR AND RESPONSES TO PREY ABUNDANCE: TOWARDS AN ECOLOGICALLY-BASED AGRICULTURAL PRACTICE **Chong Leong Puan, Greg S. Baxter, Anne W. Goldizen, Mohamed Zakaria and Mohd N. Hafidzi**	
16:00-16:30	*Coffee break / Poster viewing*	Poster Area

Session IYB: Population threats and Conservation ***Chairpersons: Dr Martin Gilbert and Mary Jo Willis***		
14:00-14:18	PRIORITIES FOR THE CONSERVATION OF THE SAKER FALCON **Nick Fox**	Hustai Conference Hall-2
14:20-14:38	THE ASSESSMENT OF HIGH RISK UTILITY LINES AND CONSERVATION OF GLOBALLY THREATENED POLE-NESTING STEPPE RAPTORS IN MONGOLIA **Amartuvshin Purevdorj, Gombobaatar Sundev, Harness Richard**	
14:40-14:58	A HABITAT COMPLEX APPROACH TO SAVE JAVAN HAWK EAGLE (*Spizaetus bartelsi*) IN WESTERN PART OF JAVA: A CASE STUDY, GAP ANALYSIS, COMMUNITY PARTICIPATION, AND SYNERGISM **Kuswandono, Arzyana Sunkar, Lilik Budi Prasetyo, Usep Suparman, Adam Supriatna and Wim Ikbal Nursal**	
15:00-15:18	RAPTOR SANCTUARY: A COLLABORATIVE SCHEME FOR RAPTOR CONSERVATION AND HABITAT PRESERVATION IN INDONESIA **Gunawan, Bambang Supriyanto, Willy Ekariyono, Sri Mulyati**	
Session Y. Ecotourism and Chemistry ***Chairpersons: Dr William Heinrich and Nyambayar Batbayar***		
15:20-15:38	RAPTOR ECOTOURISM PROGRAM IN RIAU PROVINCE **Wishnu Sukmantoro**	Hustai Conference Hall-2
15:40-15:58	SEASONAL VARIATION OF HEMATOLOGY AND BLOOD CHEMISTRY IN COLLARED-SCOPS OWL (*Otus bakkamoena)* **Pei-I Lin, Bi-Huei Chang, Fang-Tse Chan**	Hustai Conference Hall-1
16:00-16:30	*Coffee break / Poster viewing*	Poster Area
17:00-17:30	*ARRCN's event*	Conference hall
17:30-19:00	*"International bazaar" event*	Conference hall
19:00	*Dinner*	Hustai restaurant
20:00	"HawkViewTaiwan" -Roger Wang's show: "The Etudes" -about the breeding of Besra and Mountain Hawk-eagle in Taiwan "Oriental Waltz" –about Indian Black Eagle	Conference hall

Day 4: 26 June, 2010 (Saturday)

WORKSHOP 5. RAPTOR FIELD SURVEYS: TRAPPING AND MARKING		
09:00-09:30	RAPTOR TRAPPING AND HANDLING TECHNIQUES FOR SCIENTIFIC RESEARCH **William Heinrich**	Hustai Nuruu national park
09:30-10:00	MARKING AND TRACKING METHODS FOR BIRDS OF PREY: WHY DO IT AND WHAT OPTIONS ARE AVAILABLE **Todd Katzner**	Hustai Nuruu national park
10:00-10:30	HIGH FREQUENCY GPS-GSM TELEMETRY FOR STUDY OF MOVEMENT ECOLOGY OF RAPTORS **Todd E. Katzner, Tom Anderson, Trish Miller, Michael Lanzone**	Hustai Nuruu national park
10:30-11:00	WILDLIFE TRACKING WITH ARGOS **Aline Duplaa**	Hustai Nuruu national park
11:00-13:00	*Raptor trapping and handling practice*	Hustai Nuruu national park
13:00-14:00	*Lunch*	Hustai Nuruu Restaurant
14:00-18:30	*Breeding raptor watch excursion in the park*	Hustai Nuruu national park
19:00	*Banquet dinner and closing ceremony*	Hustai Nuruu Restaurant
21:00	*Arrangement for departure*	

Day 5: 27 June 2010 (Sunday)

07:00-12:30	Raptor Watch*	Hustai Nuruu National park
12:30-14:00	Leave Hustai Nuruu tourist resort to Ulaanbaatar	
14:00-15:30	Arrive in Ulaanbaatar and Departure	

Table of Contents

ORAL ABSTRACTS

TAXONOMY, STATUS AND DISTRIBUTION

BREEDING BIOLOGY

MOVEMENT AND MIGRATION

POPULATION THREATS AND CONSERVATION

BEHAVIOR, ECOTOURISM AND CHEMISTRY

POSTER PRESENTATIONS

Welcome speech

I am very pleased to hold such an exciting ARRCN (Asian Raptor Research and Conservation Network) Symposium in this paradise for breeding raptors.

At first, I would like to express my appreciation to all of the Organizing Committee Members in Mongolia who have devoted themselves to prepare this wonderful Symposium. Among them, I sincerely appreciate Dr. Gombobaatar for chairing this Symposium.

I also feel grateful to the Peregrine Fund for providing us with this valuable opportunity to gain essential knowledge and develop techniques for raptor research and management.

The first Symposium on Asian Raptors was held in Japan twelve years ago, in 1998. It was a challenge for us to promote raptor research and conservation activities in Asia. I have never forgotten the impressive keynote speech by Dr. Bill Burnham of the Peregrine Fund. He made a powerful impact with his presentation which initiated us into the importance of Asian Raptors as a vital part of the conservation of raptors in the world. We were all inspired to establish the ARRCN to promote raptor research and conservation throughout Asia.

When the ARRCN was established in 1999, there were few raptor researchers in Asia and little information about raptors, even about their distribution. However, the number of raptor researchers, especially young students, increased through symposiums which were held every two years.

As you know, the second symposium was held in Indonesia, the third was in Taiwan, the forth was in Malaysia, and the most recent was held in Vietnam. The location for this 6th Symposium in Mongolia is a result of the kind offer by our Mongolian members. However, I was very anxious about this location at first because Mongolia is too far from other Southeast Asian countries where former symposiums were held. I wondered how many members would be able to join this symposium due to the high cost of traveling. It has been truly challenging for us to create this symposium via our passion and experience with raptors in these 12 years.

Now, I cannot believe my eyes as so many raptor researchers are in attendance not only from Asian countries but also from many countries around the world. I am so pleased to see many ARRCN members from Southeast Asian countries attending by their own means. In addition, we are all honored by the Peregrine Fund's sponsorship of this special workshop on raptor research and management.

Therefore, I definitely believe that this Symposium will be an irreplaceable opportunity for ARRCN to progress to the second stage of raptor research and conservation activities in Asia cooperatively with all countries on Earth.

One characteristic of Asia is the rich diversity of nature and culture. Rich biodiversity enables many kinds of raptors to inhabit the area. Moreover, there are so many subspecies of raptors due to the large number of island present in Asia just as so many different languages and cultures exist. On the other hand, we have many migratory raptors that live on natural resources distributed in huge ranges beyond national borders.

I believe we must promote raptor research and conservation which focuses both on the local environment with local people and on the total range of Asia. I believe in diversity of environment, diversity of wildlife, diversity of human culture, and diversity of philosophy combined with with mutual passion to conserve nature on Earth, thereby leading to diversity of raptors in Asia.

Finally, I hope this Symposium will be a precious opportunity for all participants to be inspired and encouraged to create a wonderful world for raptors and humans.

President of ARRCN

Toru Yamazaki

Welcome speech

Dear conference chairs, conference organizers, guests and representative and ladies and gentlemen

I bid you all a warm welcome. It is an honor to announce the official opening of the 6th International Conference on Asian Raptors Research and Conservation.

Raptors play an important role in an ecosystem's chain of food and energy. Thus they are an indicator of an ecosystem's quality. Our planet's environmental degradation has caused a decline in many raptor species populations. Therefore, national measures such as hunting laws, Red Data books, international activities such as conventions and contracts are being conducted by many countries to save this group of birds.

Ever since mankind came into being, much evidence shows that we have learned to live in close relationship with nature , especially with raptors. In Mongolia, we have worshipped raptors from long-ago for they were used in hunting and were a source of pride for the prosperous. A history such as this exists in many countries. We can see from natural, historical and social evidence that raptors have played an important role in our lives.

In order to research and conserve raptors, it is important for researchers, scientists, policy makers, policy executors and citizens from every country where raptors breed, winter, summer, and migrate through to exchange information and knowledge on studying and conserving raptors. As Mongolia is a breeding ground for many near threatened raptors such as the Upland Buzzard, Steppe Eagle, Golden Eagle, Saker Falcon, Amur Falcon, Lesser Kestrel, Cinereous Vulture and Lammergeier, it is no coincidence that the 6th symposium on "Asian raptors research and conservation: present and future" is being organized here, and I believe this conference is an important event for Mongolian ornithology as well as bearing a great significance to Mongolian and Asian raptor research and conservation.

I would like to express my greatest gratitude to the Mongolian Ornithological Society, Mongolian National University, Ministry of Nature, Environment and Tourism, Mongolian Academy of Science, Asian Raptors Research and Conservation Network, Peregrine Fund who have worked together to organize this conference. In particular ARRCN's chairman Toru Yamazaki, the conference's organizing committee chair Prof. S. Gombobaatar and his fellow workers at the Mongolian Ornithological Society, representatives from the National University of Mongolia, the Peregrine Fund, Dr. Rick Watson, as well as all representatives, scientists, researchers and guests involved in this symposium.

I have faith that this conference on Asian raptors research and conservation will be successful and will contribute greatly to international raptor research and conservation cooperation.

Thank you for your attention.

Ch.Jargalsaikhan

Vice Minister,

Ministry of Nature, Environment and Tourism

Representative Oral Presentations

CAMBODIA

ECOLOGY & CONSERVATION OF THE GREY-HEADED FISH EAGLE (*Ichthyophaga ichthyaetus*) AT TONLE SAP LAKE, CAMBODIA

Ruth Tingay,[1] Malcolm Nicoll[2], Sun Visal[3]

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The Grey-headed Fish Eagle (*Ichthyophaga ichthyaetus*) is a poorly-studied raptor ranging from north east India, down the Thai-Malay Peninsula, to Indonesia. The species is in apparent population decline but virtually nothing is known of its specific ecological requirements in any part of its range. In 2005 we discovered a high-density breeding population in part of the seasonally flooded swamp forest surrounding Tonle Sap Lake in Cambodia. We suggest this is a regionally significant population, after reported declines in neighbouring Thailand, Vietnam, Laos PDR, Myanmar and Malaysia. We have undertaken research on the species' breeding and foraging ecology for the last five years, demonstrating that this fish eagle population requires relatively tall nest trees with an open-canopy structure, situated close to permanent water (as opposed to the seasonal temporary water that recedes from the forest during the eagles' breeding season). This population is partially reliant on water snakes, as well as fish. We have identified two main threats to this population's stability: (a) the unsustainable mass harvesting of water snakes - an estimated 6.9 million snakes are removed from the swamp forest each year for human consumption, food for thousands of captive crocodile farms around the lake, and for the illegal medicinal trade in Southeast Asia; and (b) the Chinese development of large hydropower dams in the upstream reaches of the Mekong River, which have the potential to cause significant changes to the seasonal flood regime, affecting the productivity of the Tonle Sap ecosystem. We discuss our on-going studies, including colour-banding juveniles, mercury sampling, and rapid assessments for fish eagles in other parts of this vast swamp forest. We also discuss the successes and failures of our efforts in local capacity building and long-term fish eagle monitoring.

INDIA

THE DIET OF INDIAN EAGLE OWL AND ITS AGRONOMIC SIGNIFICANCE IN THE INDIAN SCENARIO

Satish Pande

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We studied habitat preference and diet of 44 pairs of Indian Eagle Owl *Bubo bengalensis* in western Maharashtra State, India. The habitats with a larger proportion of agricultural and scrub land were rich in rodent, avian and bat prey. Rodents were mainly captured from agricultural land, both in terms of species richness and biomass. Further, owls spent a longer duration of time in agricultural habitats, where they have a higher productivity. This also implies greater likelihood of owls experiencing human contact and interference. The analysis of diet showed that rodentia and insectivora constituted 54.7 %, insects 25.9%, birds13.4 %, bats 4.5%, and other prey (civets, hare, agamas, geckos, skinks, snakes, amphibians and arachnids) 1.54% in terms of relative frequency. Out of the 13 species of rodents found in the diet of the Indian Eagle Owl, 7 species are recognized as major rodent pests in India, 1 species of bat is an agricultural pest, 3 species of insects are plant pests, and 3 species of scorpions inflict stings on the farming community. The Indian Eagle Owl plays a positive role in biological control of crop pests and an important role in the Indian agronomic scenario. This owl is still persecuted due to superstitious beliefs and for black magic. Hence scientific evidence based on local data could play a major role in its conservation, especially if the importance of the species in pest control is conveyed to the farming communities where the owl resides.

INDONESIA

CURRENT STATUS OF DIURNAL RAPTORS IN INDONESIA AND THEIR CONSERVATION CHALLENGES

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Indonesia is an archipelagic country comprising 17,508 islands. Indonesia's size, tropical climate, and archipelagic geography supports the world's second highest level of biodiversity (after Brazil), and its flora and fauna is a mixture of Asian and Australasian species. In terms of raptors, there are 68-76 species

of diurnal raptors found in Indonesia and 10-16 of which are endemics (Balen, 1998; Bildstein *et al*., 1998; and Ferguson and Christie, 2005). This high endemism among raptor species reflects the diversity and uniqueness of their habitat types, which is mainly dominated by tropical rainforests. Globally, Indonesia is also the wintering area for many raptor species from Japan, Korea, Siberia, etc. Unfortunately, rampant habitat loss and illegal trade threaten some species (IUCN 2008). Two species are listed as Critically Endangered (Flores Hawk-eagle *Spizaetus floris* and *Spilornis baweanus*), one species is Endangered (Javan Hawk-eagle *Nisaetus bartelsi*), three species are Vulnerable (New Guinea Harpy Eagle *Harpyopsis novaeguineae*, Greater Spotted Eagle *Aquila clanga*, and Wallace's Hawk-eagle *Spizaetus nanus*) and the Red Data Book (Birdlife International, 2003) also adds Mountain Serpent Eagle *Spilornis kinabaluensis* as Vulnerable. Furthermore, three species are listed as Near Threatened (Gurney's Eagle *Aquila gurneyi*, Lesser Fish Eagle *Ichthyophaga humilis*, and Grey-headed Fish-eagle *Ichthyophaga ichthyaetus*). This paper describes and discusses the current status of all diurnal raptors in Indonesia and their conservation challenges.

MALAYSIA

CURRENT STATUS AND DISTRIBUTION OF DIURNAL RAPTORS IN MALAYSIA

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Malaysia consists of two territories, Peninsular Malaysia at the southernmost tip of continental Asia and East Malaysia, on the island of Borneo. Malaysia has a rich diversity of diurnal raptors as a consequence of its location in the tropics of the Oriental region and also because the country is situated on the migration routes of many migratory raptors. At least forty-three species of diurnal raptors are currently known to occur regularly. Of these, twenty-one and twenty-four species are resident and migratory respectively, with three species represented by both resident and migrant populations. Two species, Mountain Serpent-eagle *Spilornis kinabaluensis* and White-fronted Falconet *Microhierax latifrons*, are Bornean endemics, with their ranges almost confined within East Malaysia. Eight species are listed as globally threatened: four species each categorized as Vulnerable (VU) and Near-threatened (NT). Three migratory raptors, Eastern Honey-buzzard *Pernis ptilorhyncus orientalis,* Black Baza *Aviceda leuphotes,* and Chinese Goshawk *Accipiter soloensis,* occur annually in significant numbers, with seasonal totals in the thousands for each species. Raptors have not been well studied in Malaysia, with only limited information available on a few species. This paper assesses the current conservation status and distribution of diurnal

raptors in Malaysia based on data obtained from the Bird-I-Witness database maintained by the Malaysian Nature Society and on information from the author's field observations. Notes on habitat preference and breeding of selected species are also presented.

MONGOLIA

BREEDING ECOLOGY OF THE STEPPE EAGLE *(Aquila nipalensis)* IN MONGOLIA

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The Steppe Eagle, (*Aquila nipalensis*), is a large bird of prey with a total body length of 620-740 mm, a wingspan of 1650-1900 mm, and body mass of 2400 to 3900 g. It breeds from west-central Eurasia from Romania to south-west and south-central Russia. In central Asia it is found from central-south Russia to Mongolia, western China and south-west Siberia. The European and Central Asian birds winter in Africa, and the eastern birds in India. The eastern race *A. n. nipalensis* is larger and darker than the European and central Asian *A. n. orientalis*. The Steppe Eagle was once considered to be closely related to the non-migratory Tawny Eagle, *Aquila rapax*, and the two forms treated as conspecifics. They were split based on pronounced differences in morphology and anatomy, and molecular analysis indicates that these birds are not even close relatives. The allopatric Steppe Eagle and Tawny Eagle exhibit clear differences in ecology and behavior, as well as being diagnostically different in anatomy, structure, and plumage. The Steppe Eagle is a migratory species in Mongolia that breeds in the forest, high mountains, and different types of steppes. We studied 49 breeding pairs for a decade, 1998-2007. Eagles selected seven different types of substrates –91.2% nested on the ground (47.8% in rock column and 32.5% in breaking rocks), on cliffs (8.7%), in trees (2.2%) and 8.8% took advantage of artificial substrates including car cabin (4.4%), car tire (2.2%) and artificial nest platforms (2.2%). The year did not affect nest site selection and there was no difference between type of nest site and clutch size or the number of young fledged successfully. Steppe Eagles are mostly ground nesters and their diet is comprised mostly of Brandt's Vole (*Lasiopodomys brandti)*. Breeding pairs prefer to nest in the midst of 20-30 m high rocks or rock columns on top or on the side of hills in the center of active colonies of voles. Only one pair occupied a nest platform from among the 100 platforms built by our team in 2002. Average clutch size was 1.9 (±0.6 SD, 1- 3, n=43) and the number of young fledged per pair was 0.89 (±0.8, 0-3, n=37). All nests were located between 1100 - 2500 m ASL (0 ground - 25 m cliffs). Altitude, height of nest location, and nest size (nest diameter, depth, and height) did not influence the number of eggs laid and young fledged successfully.

RUSSIA

SOURCE-SINK POPULATIONS OF THE STELLER'S SEA EAGLES (*Haliaeetus pelagicus*) IN THE NORTHERN PART OF THE SEA OF OKHOTSK: ECOLOGICAL TRAPS AND THEIR CONSERVATION IMPLICATIONS

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For the past 18 years we have monitored the numbers and breeding output of the Steller's Sea Eagles in Magadan District and the adjoining administrative territories. Every year we checked 20–133 territories in constant 'model' study areas located near Magadan, amassing data from a total of 1130 potential breeding attempts, 490 at home ranges which produced eggs (at least) in most years. The majority of eagle nests were found along the sea coasts (70%), the rest along rivers. The eagles breed more successfully along the sea coast than on the rivers, suggesting the existence of source-sink population dynamics. The total number of chicks fledged per successful pair was more or less stable across the years, with lower values along the rivers. The net chick output from all constantly monitored areas showed a statistically insignificant increase in the coastal environment, while on the rivers chick output declined significantly. We documented zero breeding success in the Kava- Chelomdja portion of the Magadan Reserve and along the upper stretch of the Tauy River in 2009. In view of these long-term data it appears that the breeders along the rivers are a 'sink', as they continuously produce fewer offspring than needed to maintain a constant population level. In contrast, the sea coast territories are a 'source' population, producing more chicks than necessary for population stability. Satellite tracking of young eagles revealed presence of naturally occurring ecological traps along the migration routes. These traps were areas of the fish-rich rivers which remained open while other sections of the rivers and the sea froze over as winter progressed. The eagles that stayed too long in these places were eventually unable to feed themselves due to diminishing food availability and were cut off from the wintering grounds by the frozen sea, and died. Conservation implications of these findings are discussed.

SINGAPORE

OVERVIEW OF RAPTOR MIGRATION IN SINGAPORE FROM THREE YEARS OF OBSERVATIONS (2007-2010)

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Located at the tip of the Malaya Peninsula, Singapore does not fall on the main migratory route of raptors flying between the Peninsular and Sumatra, Indonesia. As such, large numbers of migrating Chinese Sparrowhawk (*Accipiter soloensis*), Oriental Honey-buzzard (*Pernis ptilorhynchus*) and Black Baza (*Aviceda leuphotes*) that are observed over Central and West coast of Malaysia are not seen in Singapore. In our study, we collected data on all raptors observed migrating or wintering in Singapore over a period of three years. Our study aims to show the diversity and abundance of raptors that regularly migrate and winter in Singapore. We compiled three years of records from field observations for a six month period from October to March for 2007/2008, 2008/2009 and 2009/2010 and two full day Raptor Watches (9th Nov 2008 and 8th Nov 2009) to form a baseline database of migratory raptors in Singapore. Our three years of data also filled many gaps on the status and patterns of spring and autumn migration between the Malay Peninsula and Indonesia. Our findings consistently confirmed that peak raptor passage occurs in November. Of the 25 migrant raptor species listed in the Singapore checklist, we recorded a total of 18 species. We also confirmed that the migration path taken by the raptors is not confined to western Singapore, but also in the eastern and southern parts of the island. The Oriental Honey-buzzard (*Pernis ptilorhynchus*) is the most abundant migratory raptor, followed by the Black Baza (*Aviceda leuphotes*) and the Japanese Sparrowhawk (*Accipiter gularis*). Surprisingly, of the thousands of Chinese Sparrowhawks (*Accipiter soloensis*) observed to migrate through Malaysia, few reach Singapore and we have less than 20 records of this species annually. Due to better observation field coverage, we now have more records of otherwise rare species, and these may in fact be more common than previously thought. They include the Rufous-bellied Eagle (*Hieraaetus kienerii*), Jerdon's Baza (*Aviceda jerdoni*), Common Buzzard (*Buteo buteo*), Pied Harrier (*Circus melanoleucos*), Booted Eagle (*Hieraaetus pennatus*) and Common Kestrel (*Falco tinnunculus*). Other rare migratory raptors documented include a Greater Spotted Eagle (*Aquila clanga*) in November 2007 and two birds together in October 2009; three Himalayan Vultures (*Gyps himalayensis*) in January 2008 and one bird in January 2010; and a Short-toed Eagle (*Circaetus gallicus*) in November 2009. A new addition to the national list was an Amur Falcon (*Falco amurensis*) sighted at reclaimed land in eastern Singapore in Nov 2007. We also recorded large flocks of Black Bazas numbering in the 50s and 60s. An unusual record is high counts of 359 Oriental Honey Buzzards recorded in one afternoon during the Spring migration in March 2009. This is the first record in spring of large numbers of Honey Buzzards sighted on passage on northbound migration.

THE REPUBLIC OF KOREA

TERRITORY SIZE OF BREEDING CHINESE SPARROWHAWKS (*Accipiter soloensis*) IN KOREA

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The Chinese Sparrowhawk (*Accipiter soloensis*) is the most common breeding raptor in Korea and mainly breeds on forest edges near freshwater wetlands and rice paddies. However, there is little information on its breeding territory size. Therefore, to estimate the territory sizes and home ranges of breeding sparrowhawks, six territorial males (four in 2005 and two in 2006) were observed from May to September at Musu-ri (N 37° 27', E 127° 17'), Gwangju, Central Korea. Main perches such as electricity poles and tall trees, which were repeatedly used more than three times or where apparent territorial behaviors were observed, were identified and analyzed by ArcView GIS 3.2 software. As a result, 25.2±5.3 points (range: 19-35) were identified as main perches. According to 100% Minimum Convex Polygon (MCP) methods, the Chinese Sparrowhawks occupied 3.62±0.55 ha for breeding territories. Considering the previous studies that the breeding sparrowhawks may use 2.95 ha home ranges and 1.05 ha territories, this estimation showed larger territory sizes. This study suggests that the Chinese Sparrowhawks occupy small areas throughout the breeding season, and they are thus probably more vulnerable to habitat changes and resource exploitation on a small spatial scale. Although this study was based on observations solely for territory size estimation, the estimation may be worthy to note as a preliminary pilot research before confirmative studies using radio-telemetry techniques.

TAIWAN

THE DIET OF CRESTED GOSHAWK (*Accipiter trivergatus*) IN MOSAIC FOREST LANDSCAPE AND DIET SEGREGATION IN CONGENERIC SPECIES

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We studied the prey composition of Crested Goshawk (*Accipiter trivergatus*) nesting in mosaic forest landscape in Northern Taiwan. Based on direct observation of food remains and pellets collected from 11 nests, there were 621 prey items. Mammals and birds contributed 61.7% of prey frequency and 96.8% of prey biomass. Birds were the most prevalent prey items (42.5%), but they constituted only 45.4% of prey biomass, less than that of mammals (51.4%). The most common prey among mammals included rodents (*Ruttus* spp.) and squirrels, among birds *Megalaima oorti*, *Passer montanus*, *Otus lettia* and *Myiophoneus insularis*, among lizards *Japalura polygonata* and *Sphenomorpbus indicus,* and *Cryptotympanp holsti* among insects. Comparing to the sympatric Besra Sparrowhawk (*Accipiter virgatus*), the prey items captured by Crested Goshawk were heavier and the prey diversity index was higher. The spatial distribution, availability, and mobility of the prey items also differed between those used by these two congeneric raptor species.

THAILAND

BIOMETRICS AND POST-RELEASE TRACKING OF REHABILITATED HIMALAYAN GRIFFON VULTURES IN THAILAND: 2007 – 2010

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The first release of one rehabilitated Cinereous Vulture *Aegypius monachus* and four Himalayan Vultures *Gyps himalayensis* occurred in Thailand in May 2007. Since then, due to increased awareness of the raptor rehabilitation and release program by Kasetsart University Raptor Rehabilitation Unit (KURRU), Department of National Parks, Wildlife and Plant Conservation and Bird Conservation Society of Thailand, 16 Himalayan Griffon Vultures caught by people in winter months were submitted to KURRU for rehabilitation. All of these were eventually released on their passage migration route in spring. Himalayan Griffon Vulture is considered a vagrant in Thailand. However, due to more coverage of birding activity and awareness of the raptor program, sightings of the species since 2007 have been regular and 10-30 individuals were annually recorded. All but two vultures were found in provinces in southern Thailand, and the two vultures were from north-eastern and western provinces, respectively. These data, along with annual sighting records, suggest that there might be two major routes of entry to the county by migrating vultures. One is the western route from northern, western, southern Thailand, followed by travel farther

south to peninsular Malaysia. The other route is an eastern route from northern Thailand, north-eastern Thailand and eastern Thailand bordered by the inner Gulf of Thailand. All vultures were biometrically measured, and sexed by PCR method. Based on plumage, fifteen vultures were in juvenile plumage while the other was in second calendar-year plumage. There was no significant difference in sexual dimorphism. Sexual bias on either sex among these rehabilitated vultures was not evident. The locality of origin of these vultures was so far unknown. Thus, to study the post-release movement of the released vultures and to gain more insight into the migration route, location of origin, and whether natal fidelity might play a role in movement, all 14 vultures released in 2008-2009 were individually marked with a plastic wing-tag and metal band. Two vultures scheduled for release in April 2010 will be similarly marked and additionally satellite-tracked with backpack-type PTT units. One of the ten vultures released on 9 April 2009 was downed by a thunderstorm and found in Changchun city of Jilin province on 20 July 2009. The distance between the release site in western Thailand and the re-sighted location was approximately 3,900 km. The movement of the satellite-tracked vultures to be released in late April 2010 will be presented in the symposium.

VIETNAM

RAPTOR MIGRATION AT CUC PHUONG AND XUAN THUY NATIONAL PARKS, NORTHERN VIETNAM

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During 2008-2009 we carried out raptor migration surveys at Cuc Phuong and Xuan Thuy national parks in northern Vietnam. A total of 11,585 individuals belonging to 13 species were recorded by direct counting. The most common species were Grey-faced Buzzard *Butastur indicus*, Oriental Honey-buzzard *Pernis ptilorhynchus*, Black Baza *Aviceda leuphotes*, Chinese Sparrowhawk *Accipiter soloensis* and Japanese Sparrowhawk *Accipiter gularis*. We initially identified the main migration routes and directions at Cuc Phuong national park during the autumn migration season is from north-east to south-west and from west to north-east in spring. At Xuan Thuy the main direction is from north to south in autumn and from south to north-east in spring. Cuc Phuong national park has been identified as one of the important raptor migration sites in the northern Vietnam. The migration at Xuan Thuy national park is the first record for raptor migration along the coast of Vietnam.

Oral Abstracts

TAXONOMY, STATUS AND DISTRIBUTION

DISTRIBUTION AND ABUNDANCE OF WINTERING RAPTORS IN THE KOREAN PENINSULA

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The purpose of this study is to find any changes in distribution and abundance of wintering raptors in Korea. The data collected by the NIER (National Institute of Environmental Research) during 2000-2007 were used in this study. A total of 6,623 raptors of 16 species were recorded at 108 different points on the west, south and east coasts, also in reservoirs (dam lakes), estuaries and rivers of inland areas all over Korea. During the study period, the most abundant raptors were Cinereous Vulture (*Aegypius monachus,* 62.5%), Common Kestrel (*Falco tinnunculus*, 12.5%) and Common Buzzard (*Buteo buteo,* 9.8 %). Other species, such as the Hen Harrier (*Circus cyaneus,* 3.3%), White–tailed Eagle (*Haliaeetus albicilla,* 2.5%), Black Kite (*Milvus migrans, 2.5%*), Osprey (*Pandion haliaetus,* 2.4%) and Peregrine Falcon (*Falco peregrinus,* 1.2%) were also found. 2005 and 2006 were the years with the highest raptor abundance during study periods. The data on distribution and abundance of raptor species were analyzed using Generalized Liner Models. Species, time and habitats (inland or coastal, west, south or east coast, etc.) were used as factor variables and abundance used as a dependent variable. According to our result, the *Cinereous Vulture* (r^2 =0.60, *P*= 0.02) and Peregrine Falcon (r^2 =0.57, *P*= 0.03) have been increasing while the Pied Harrier (*Circus melanoleucos*, r^2 =0.54, *P*= 0.04) has been significantly decreasing in abundance among 16 raptor species during study periods. We also found that not only abundance of species was different (*P*< 0.05) but species and coastal/inland habitats had an interaction effect (*P*<0.05). This implied that there is a difference between abundance of the species inland (mean= 30) and coastal areas (mean= 15). Within coastal areas, species abundance on the west and south coast was higher than on the east coast (*P*= 0.00). In inland areas, abundance of species in reservoirs and dam lakes was higher than in estuaries and lakes (*P*< 0.05). We presume that raptors prefer reservoirs and dam lakes more than estuaries and rivers due to presence of less disturbance by humans in these areas.

THE STATUS AND DISTRIBUTION OF PALLAS'S FISH EAGLE *(Haliaeetus leucoryphus)* IN MONGOLIA

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Pallas's Fish Eagle (PFE, *Haliaeetus leucoryphus* Pallas, 1771) was formerly considered locally common across central and southern Asia in an area extending east from the Caspian Sea, through southern Russia, Kazakhstan and Mongolia as far as Manchura, and south to Pakistan and northern India (Birdlife International, 2001). A literature survey was conducted in the collections of the National University of Mongolia, and available English, Mongolian and Russian-language sources. From these, we sought to obtain information on each reported PFE sighting, including date, location, number and age of individuals and any other pertinent information. In 2009, support from The Peregrine Fund's small grants program enabled an extension of this work by funding targeted surveys to a much greater number of wetlands. Surveys took place during two phases. The first was conducted concurrent with on-going avian influenza surveillance activities (June- August, 2009), and included two locations listed within the *Threatened Birds of Asia* (Uvs Lake and Ugii Lake). A second survey (August 2009) was focused on PFEs specifically and included visits to a further 11 sites where the species had previously been recorded. In total PFEs were sighted 15 times during the surveys, with observations representing an estimated minimum of 20 individuals. Of the 13 historic sites visited, PFEs were observed at 8 locations. The highest number of individuals was observed on Airag Lake and adjacent Zost Lake, with an estimated minimum of 4 adult and 2 juvenile birds. As the majority of surveys occurred after the offspring from successful breeding attempts would have fledged, it was not possible to determine with certainty the location of PFE breeding sites in Mongolia. However, fledgling eagles were observed at four sites, Ugii Lake, Airag/Zost Lake, Achit Lake and the Chono Kharaikh River. Potentially significant threats were observed at seven of eight sites where PFEs were found. These included perturbation in water level associated with hydroelectric dams, over-fishing, and receding water levels in arid areas. This study confirmed the continued presence of PFEs in several locations in western and central Mongolia, and observations should form the basis for comparison for future surveys to quantify species population trends. PFEs are a migratory species in Mongolia and essentially nothing is known of the population's migratory movements and habitat needs during the non-breeding period. Baseline studies of breeding ecology and migration must be considered as priorities for future studies.

THE SAKER FALCON IN THE RUSSIAN PART OF ALTAI-SAYAN REGION: STUDY RESULTS OF POPULATION STATUS

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The number of Saker Falcons (*Falco cherrug*) in Russia is estimated between 2100 to 2900 pairs, 73.5% of which breeds in the Altai-Sayan region. A field group of the Siberian Environmental Center and the Field Study Center carried out surveys to estimate numbers of the Saker Falcon in the Russian part of the Altai-Sayan ecoregion in 1999–2009. The total length of survey routes in 2008, when the last complete monitoring has carried out, was 8095 km. We set up 18 study plots with a total area of 12150 km^2. Density parameters that were calculated for habitats in the study plots were extrapolated on similar habitats of the region with use of GIS-software (ArcView 3.3 ESRI). The total area of typical habitats of the Saker in the Russian part of the Altai-Sayan region under extrapolation was about 150000 km^2. At the moment we know 362 breeding territories of Sakers in the Altai-Sayan region. We surveyed 125 breeding territories in 2008, 108 of which were noted to be occupied by birds and 55 to be successful. A total of 1372–1646 breeding pairs and 778 successful pairs are estimated to inhabit the Altai-Sayan region in 2008. Nesting in absolutely different habitats the pairs of Sakers usually try to keep a distance of 4–7 km between their nearest neighbors. The average distance between nearest neighbors in the entire region is 6.44±3.32 km (n=297; range 730 m – 16.3 km). A negative trend of Saker numbers has been registered all over the Altai-Sayan region. Monitoring of empty and occupied nests has shown that in the Altai-Sayan region the number of Saker Falcons has decreased by more than 70% for the last 25 years and 18% during the last 5 years (2003–2008). Illegal catching and smuggling of birds are the main negative factors that affect the falcon populations at present. In the Altai-Sayan region for last ten years the maximal decline in especially females has been observed, which indicates an effect of catching. At 29 nests in 1999-2008 we recorded a disappearance of pairs at 2 nests, disappearance of females at 5 nests, change of males at 3 nests and females at 16 nests. There are many other negative impacts of human activities: poisoning, electrocution, destruction of nests by local people – however comparing with the effect of catching these factors are not so significant, but they add to its negative impact. The natural factors influencing upon the Saker population are fluctuation of prey numbers and predatory effect. In different territories breeding success of Sakers changes asynchronously according to fluctuations of the numbers of different prey species (pikas, sousliks, gerbils and big voles). The average brood size is 2.63±1.08 chicks (n=243; range 1–5 chicks). In 2008 the portion of successful nests per total number of occupied nests was only 50.9%. The predatory effect of Eagle Owl and Golden Eagle does not exceed 10% and is substantially less than the death rates of young falcons from starvation during years when prey numbers are poor.

POPULATION FLUCTUATION AND STATUS OF WINTERING ON CINEREOUS VULTURES (*Aegypius monachus*) IN KOREA

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A total of 34 researchers, two persons in each team, conducted simultaneous investigations in 17 areas (Central region: Cheolwon, Jangdan, Goseong, etc,; Southern region: Goseong, Sancheong, Jeju, etc.), known as major wintering areas for Cinereous Vultures(*Aegypius monachus*) and recorded all individuals in the areas from 20 December, 2002 to 14 February 2009. The average number of wintering Cinereous Vultures was 1052.7 individuals (SD=568.9, range=246-1,912, n=12). During the survey period, the peak number was observed on 11 January in 2008. There were 1,911 individuals in the areas. The minimum number (246 individuals) was recorded on 20 February, 2004. The regional classification based on the number of Cinereous Vultures that we conducted, high concentration was observed in the followings areas: 877.4 individuals on average (SD=516.5, range=228-1,665, n=12)(83.3%) in Gyeonggi-do and Gangwon-do and 175.4 individuals on average (SD=221.9, range=11-729, n=12) (16.7%) in southern region, Gyeongbuk, Gyeongnam, Jeonnam and Jeju, There are significant numbers of Cinereous Vultures counted in Jangdan Peninsula consisting of 338.1 individuals on average (SD=321.6, range=15-1,100, n=12) and followed by the Cheolwon region with 314.4 individuals (SD=195.3, range=52-758, n=12), both of which account for 62% of the entire population of Cinereous Vultures in Korea. There was variation of the number of wintering Cinereous Vultures during the survey period, mostly increasing trends (R^2=0.0576). In addition, Most of individuals stayed in the central region for wintering before 2006, while after 2006 20 to 30% of individuals moved down to the southern region for wintering, which is seemingly attributed to the lack of food upon suspension of feeding campaign in the central region. The ratio of Cinereous Vulture population in both regions is similar in December, the early stage of wintering, and in February, the late stage, which appears to show that Cinereous Vultures move to and settle in the southern region continuously. These individuals may return to the same place as they get accustomed to it. However, because the population is still concentrated in some specific areas, it is recommended to maintain close inspection and monitoring on the major wintering areas of Cinereous Vultures.

GOLDEN EAGLE IN THE ALTAI-SAYAN REGION, RUSSIA

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We present data on distribution, numbers and breeding biology of the Golden Eagle (*Aquila chrysaetos*) in the Altai-Sayan region in 1999–2009. The surveys covered 324 breeding territories, 227 in which the nests were located, and 97 in which no nests were located. Out of the latter 97 territories, we located juvenile eagles in 16 territories (in 14 one young were seen with adults), pairs were noted in 57 territories, single birds in breeding habitat in 24 territories (including 9 cases with displaying behavior, and 5 cases with adults carrying prey). We also carried out car survey routes in 1999 and 2000 (4120 and 3754 km respectively), which returned 28 eagles (26 records) in 1999 and 26 eagles (22 records) in 2000. We estimated a total Golden Eagle population in the Altai-Sayan region as 1411–1881, average 1646 breeding pairs. The Golden Eagle prefers to hunt in the following landscapes: mountain arid steppes –49.3%, mountain tundra–12.1%, and typical steppes–11.9%. A total of 272 nests were found at 227 breeding territories of the Golden Eagle. The average altitude of nest location was 1512.87±796.98 m (E_x=-1.43; *n*=272; range 151–2966 m). The eagles built their nests on cliffs–66.54%, and only a third of pairs nested on trees–33.46%. The preferable nesting tree species was larch (74.73%; *n*=91). Golden Eagles preferred to place nests in the middle of a tree (42.86%) in the bottom or middle part of the tree crown. The average height of nest location was 12.03±4.76 m (*n*=91; range 2–27 m). The cliff nests (*n*=181) were located on rocks on the tops of mountain ridges (29.83%), on the cliffs surrounding river valleys or depressions (29.28%), on riverine cliffs (27.07%), and on rock outcrops (13.81%). The average height of cliff nests was 38.59±40.58 m, ranging from 3–4 m to 150 m from the foot of the cliff. The majority of nests were placed on open ledges (79.01%) and in the upper third of a cliff (63.54%), 25.41% of nests were placed in the middle part of a cliff, and others (11.05%) in the bottom third. The average clutch size was 1.67±0.52 eggs (*n*=6), range 1 - 3 eggs, typically 2 eggs. The average egg size was 80.59±5.13õ62.52±2.71 mm (*n*=9; range 73.7–88.9õ59.0–65.9 mm). The average brood size 1.4±0.4 nestlings per successful nest and 0.98 nestlings per occupied nest (*n*=114; range 1–3 nestlings). The remains of the second nestling were found in 36.62% of nests with one nestling (*n*=71). The share of empty nests was 30.29%, occupied nests – 69.71% (*n*=208). The main prey species of the Golden Eagle were marmots (*Marmota* sp.)–20.7%, and hares (*Lepus* sp.)–15.59%. Mammals made up 63.71% (*n*=372) of the diet. There was no dominant prey among bird species, however a relatively high proportion of crows (9.95%) and grouse (9.41%) should be noted.

RAPTORS OF KARAIVETTI BIRD SANCTUARY: AN IBA SITE IN TAMILNADU, INDIA

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The Karaivetti Bird Sanctuary (10˚ 58' 01" N, 79˚ 11' 07" E) is located in Ariyalur District of Tamil Nadu. This freshwater lake is fed by river cauvery through Pullambadi Kattalai canal. It is the biggest water body in the district and attracts thousands of birds every year. The total area of the sanctuary is 454 ha and attracts large congregations of water birds. During winter, the total number of birds recorded is between 20,000 and 60,000 of 203 species, including 101 migrants. As the water body is surrounded by semi-arid and dry land the terrestrial bird population is also high. The sanctuary supports five Near-Threatened species of water birds, namely Spot-billed Pelican (*Pelecanus phillippensis*), Darter (*Anhinga melanogaster*), Painted Stork (*Mycteria leucocephala*), Oriental White Ibis *(Threskiornis melanocephalus)* and Black-tailed Godwit (*Limosa limosa),* and the Greater Spotted Eagle (*Aquita clanga)*. There are 18 species of raptors in the sanctuary, including rare Greater Spotted Eagle (*Aquita clanga),* Osprey *(Pandion haliatus),* Booted Eagle (*Hieraaetus kieneril*), and Peregrine Falcon (*Falco peregrinus)*. Four species of harriers including Pallid Harrier (*Circus macrourus),* and Pied Harrier *(Circus melanoleucos)* are also reported. Their occurrence, breeding, and wintering habits will be discussed in the paper.

LARGE FALCONS OF THE SOUTHERN BAIKAL AND THE UPPER ANGARA RIVER

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The data were collected using foot surveys in 1961-2010. The breeding range of the Gyrfalcon (*Falco rusticolus*) is located in Yakutia. We reported breeding records of the species in the Baykal region at the Nizhnaya (lower) Tunguska river (village Teteaj, 1995), and also summer sightings in the alpine zone of the Baikal mountain ridges. Spring migration was observed in the second half of March to the first half of April. Autumn migration was observed in late October to the first half of November. Numbers of wintering birds was very low: on 100 km foot survey routes, there were 0.18 birds. Gyrfalcons constantly wander in the wintering area, adhering to forest fringes or to edges of fields, meadows and islands of forests in the forest-steppe habitat. The total wintering population is estimated to be 10-15 individuals. There were no reports of the Saker Falcon (*F. cherrug*) in the first half of the 20th century. In the second half of the 20th century there were some breeding records. Spring migration begins in early April and proceeds for about one month. In the autumn the first migrants are reported in the first half of August, but the peak of migration is observed in September; however the last individuals could be seen as late as in early October.

Some Sakers also winter in the area. First clutches appear on April, 5, the latest on May, 10. The clutch size is 3 - 5 eggs. Hatching is reported from 6 May to 12 June. The young fledge from mid -June to mid-July. The Sakers prey mostly on the Long-tailed Souslik (*Citellus undulatus*). The total number of Sakers was estimated at 100-150 pairs in the 1990s. Current numbers are estimated at 30-40 pairs. The Peregrine Falcon (*F. peregrinus*) is a very rare breeder and occasional migrating species. Spring migration begins in early April and ends by mid-May. Autumn migration is observed from August to the end of September, however in warm years the last individuals are reported in mid-November. The Peregrines nest on cliff outcrops near rivers in areas of extensive boggy meadows and large lake systems. Current breeding numbers do not exceed 25-30 pairs. The number of migratory Peregrines is not very high. Up to the middle of the 20th century, a reduction of abundance of large falcons has been caused by strong human inducted factors such as conversion of forest-steppe into arable lands, land degradation and development, as well as hunting. In the second half of the 20th century a wide spread of chemical fertilizers reducing the number of rodents was also a contributing factor. In addition, global warming might be a factor of the Saker spreading to the North. However current shifts in the habitat towards tall grasses in abandoned arable lands and meadows, strongly reduces available nesting habitats. Illegal catching of these falcons for subsequent sale in Arab countries poses a big problem.

SEX IDENTIFICATION OF FIVE RAPTOR SPECIES IN THAILAND BY PCR

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Sex identification using molecular methods has proved to be a valuable tool in wildlife conservation and for studies of behavior and sex allocation. Our objective was to develop primer for sex identification of five raptor species in Thailand. Genomic DNA was extracted from blood samples, then for sex typing we used PCR-base by three primer sets based on the intron length variation between CHDZ and CHDW. The 2551-w52/2178-w52 primer set was successful in identifying the sex of four species (Himalayan Griffons (*Gyps himalayensis*), Steppe Eagles (*Aquila nipalensis*), Eastern Marsh Harriers (*Circus spilonotus*) and Oriental Honey-buzzard (*Pernis ptilorhynchus*)). However, the Barn Owl (*Tyto alba*) could not be sexed with this primer set. Moreover, the P8/P2 primer set was successfully used to identify the sex of all species by restriction enzyme *HaeIII*, which recognizes a cleavage site in the W chromosome.

BREEDING BIOLOGY

SIBLING COMPETITION INDUCES STRESS INDEPENDENT OF NUTRITIONAL STATUS IN BROODS OF UPLAND BUZZARDS

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In any evaluation of the health and well being of wildlife, whether to test biological theory or evaluate conservation problems, it is imperative to know to what degree variables are operating independently. Too often, important ecological and physiological traits such as body mass, immune function, blood parameters may have a single causal agent, and example of which is glucocorticoids, corticosterone in birds, secreted in response to environmental stressors. We evaluated the nutritional condition of broods of Upland Buzzards in Mongolia using ptilochronology, a measure of growth rate of feathers, and the amount of corticosterone (CORT) in feathers as a long-term integrated measure of stress. Absolute amount of feather CORT was not significantly related to food supply, attributes of the brood or feather growth rate. However, the relative amount of CORT of junior chicks vs their senior siblings increased as the age difference between them increased. Similarly in the area with larger broods, and hence more sibling competition, junior sibs showed relatively higher amounts of stress. These results suggest that stress was associated with sibling conflicts, and that it was not a product of the consequences of the nutritional condition of the individuals.

NEST-SITE SELECTION OF CRESTED SERPENT EAGLE *(Spilornis cheela)* IN KOLLI HILLS, TAMILNAU, INDIA

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Nest-site selection of the Crested Serpent Eagle *Spilornis cheela* was studied in the Kolli Hills from May 2005 to May 2007. In total, 27 active nests were identified, but accessibility to collect nest-site details was possible for only 16 nests. Nest construction was shared by both sexes. No crested serpent eagle was

found constructing a new nest during the study period. Serpent eagles renewed or altered the old available nests in the study area largely in December. Both sexes were involved in renewal activities. The clutch size was single and the mean incubation period was 38.5 days. The mean fledging period was 62 days. Nest site selection variables were collected at three levels: nest, nest-tree, and nest-patch. Random plots were also established to compare with the nest sites selected by eagles. Nests were found largely along riverine patches in the following tree species *Terminalia bellirica (6), Dalbergia latifolia (8), Tectona grandis (1), Lagerstroemia lanceolata (5), Mangifera Indica (6),* and *Bombax ceiba* (1). The nests were placed at a mean height of 17.5 m from ground level. Some nest site characters were significantly different from random-sites and reflected the importance of the size and the age of the tree, and proximity to the water. The results indicate that mature and less disturbed riverine forests with large-sized trees are important for the conservation of this species.

DISTRIBUTION AND BREEDING BIOLOGY OF THE HOBBY (*Falco subbuteo*) IN THE SOUTHERN AND SOUTH-EASTERN GOBI DESERT OF MONGOLIA

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The hobby is a widely distributed raptor species in Mongolia. There is lack of information on eyries and biology of the species in Central Asia. In the past, we found breeding sites in 22 cells on a grid map that was produced by a Mongolia-German mapping program. This species breeds in Elm tree (*Ulmus pumila*) stands along dry riverbed valleys, called *Sair* in the Mongolian language, as well as in oases of the Gobi Desert eco-region. The hobby is a regular breeder occurring in low population densities in the southern and southeastern Sairs with Elm trees. Our distribution map shows its breeding area in detail and might modify the maps by Chapman (1999), Ferguson-Lees & Christie (2001) and others. We recorded a total of 71 breeding pairs within our study area. Clutch size in 20 checked nest sites was the following: 2 eggs found in two nests, 3 eggs in fifteen nests and 4 eggs in three nests. The first eggs laid were found on 12 June and first juveniles were recorded on 7 July. The brood size was 2.85 on average (n=33). Within 33 monitored nests, there was one nest with a single nestling, two nests with 7 nestlings, twenty one nests with 3 nestlings, and four nests with 4 nestlings. The hobby is one of the latest spring migrant species of the genus *Falco* in the country. Early observations of the Hobby in spring were recorded between 10 May to 16 May and the latest individuals were observed in autumn on 7 October in the south-eastern Gobi Desert of Mongolia. There is no information about wintering grounds for the population in Central Asia.

MOVEMENT AND MIGRATION

HABITAT USE OF JAVAN HAWK-EAGLE (*Spizaetus bartelsi*) IN HALIMUN–SALAK CORRIDOR AREA, GUNUNG HALIMUN SALAK NATIONAL PARK, INDONESIA

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Halimun-Salak Corridor in Gunung Halimun Salak National Park is a linear habitat remnant that connects two important forest ecosystems in GHSNP, Halimun forest area in the south and Salak forest area in the north. These two forest ecosystems harbor important biodiversity of Java Island including endangered species such as Javan Hawk-Eagle (*Spizaetus bartelsi*), Javan Gibbon (*Hylobathes moloch*) and Javan Leopard (*Panthera pardus melas*). Halimun-Salak Corridor used to be part of a production forest area and in 2003 was designated as part of the GHSNP. Unfortunately, logging activities, encroachment, and deforestation has degraded its forest condition. At the present time, the width of the natural forest corridor averages less than 1.69 km, and approximately only 216 ha of primary forest remains. The rest of the corridor is dominated by shrubs and secondary forest. GHSNP, with GHSNP Management project supported by JICA, developed the Halimun-Salak Corridor action plan to restore the condition of the corridor forest. One of the activities included in the action plan is Javan Hawk-Eagle survey and monitoring in the corridor, conducted by GHSNP and MataELANG. The objectives of these activities were to collect baseline information about the existence of the Javan Hawk-Eagle in the corridor and to assess the species' habitat use in this degraded forest. The survey started in 2005 and up to now has yielded data and information about the existence of the Javan Hawk-Eagle in this area. The method used in the survey was random sampling and cooperative method. The survey and monitoring has revealed that, even though the forest is not in an ideal condition, the Javan Hawk-Eagle is actively using the Halimun-Salak Corridor. Therefore, it is important and crucial to rehabilitate the corridor forest area to support the conservation of this species. The survey and monitoring data has provided important input for habitat management and raptor conservation policy by GHSNP management.

SOME ASPECTS OF SPRING RAPTOR MIGRATION AT TANJUNG TUAN, MALAYSIA

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Tanjung Tuan, also known as Cape Rachado, is a promontory situated at the narrowest part of the Straits of Malacca separating Peninsular Malaysia and Sumatra, Indonesia. Although Tanjung Tuan has long been known as an important raptor migration site and Important Bird Area (IBA), very little research on migration had been undertaken until the year 2000. This paper presents significant features and characteristics of raptor migration at Tanjung Tuan, based on observations and data compiled during spring migration counts undertaken by the Malaysian Nature Society from 2000 to 2010 in conjunction with "Raptor Watch Week", a public raptor awareness event held annually at this site. The highest count to date exceeded 60,000 migratory raptors comprising twelve species. The main species are Oriental Honey-buzzard, Black Baza, Chinese Goshawk, Japanese Sparrowhawk, and Grey-faced Buzzard with the Oriental Honey-buzzard accounting for more than 90 percent of the total numbers for each season. Spatial and temporal pattern of raptor migration, species composition and relative abundance at Tanjung Tuan will be the main focus of attention. Some instances of peculiar raptor flight behaviour, as witnessed in March 2010 by an observation team based in Pulau Rupat, an island directly across the Straits of Malacca, indicate a need for continued raptor research and conservation programs in this region of South East Asia.

SPRING RAPTOR MIGRATION IN THE SOUTH BAIKAL MIGRATORY PASS (BURYATIA AND IRKUTSK REGION, RUSSIA)

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The South Baikal migratory pass along the western bank of Lake Baikal is the most powerful migratory way for birds of prey in Eastern Siberia in autumn. Data on bird numbers, species composition, and dynamics were published, mainly in Russian since the 1980s (Potapov 1995, Durnev et al. 1996, Ryabtsev et al. 1991, 2000, Fefelov et al. 2004, Alexeyenko et al. in press). However, they

focus on autumn migration, which is obvious, oriented, and easily visible, while there is much less data on spring migration. We observed migration mainly in the southernmost area of the west bank of Lake Baikal (Irkutsk Region, Russia) in 2008-2009. However, some observations were made between 1987-1995 in the same area, and at the east bank north of the Selenga River delta. In spring, the northward migration is much weaker than in autumn but was found to exist, at least for buzzards and black kites. In the Kultuk area raptors fly from Khamar-Daban Mountains to the north and, unlike in autumn, they do not tend to fly the coastline along slopes, varying the flight direction (NE, N, E) according to local landscapes. On favorable days, a few tens of buzzards may be seen in spring vs. few or many hundreds in autumn. Across the taiga of the Olkha plateau between Kultuk and Irkutsk, migrants fly generally to the north. Direct migration of buzzards, hawks, and likely oriental honey-buzzards across Lake Baikal to NW in April and May was observed at least in the Selenga River delta and nearby. However, bird numbers are as low as at the southern tip of Lake Baikal. Interestingly, along the southeastern Baikal coastline between Selenga delta and Mysovaya, a migration of passerines and sparrowhawks happens differently to migration at the southwestern bank. By day, low-flying migrants go in the same direction (to SW) in both spring and autumn (Baskakov, Mikhalkin, 2000; our obs.), while along the southwestern bank they go E/NE in spring and S/SW at autumn. Perhaps the movement direction in Sparrowhawks follows small birds. Thus the raptor concentrations in spring are much less than in autumn, due to weather conditions such as air-cooling from Baikal being still ice-covered until early May, which are not as favorable for soaring flight as in autumn. However, better study is necessary for spring migration to know more about the migratory behavior of birds of prey crossing the Lake Baikal area.

MOVEMENT PATTERNS OF BREEDING CINEREOUS VULTURES (Aegypius monachus) IN IKH NART NATURE RESERVE, MONGOLIA

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We monitored nesting ecology and movement patterns of cinereous vultures, also known as Cinereous Vultures (*Aegypius monachus*), nesting in and near Ikh Nart Nature Reserve, Dornogobi Aimag, Mongolia between 2003-2009. Since 2008, we placed 5 solar-powered global positioning system (GPS) satellite telemetry units (2 units in 2008 and 3 units in 2009) on adult vultures rearing a chick. We plan on deploying an additional 5 units in 2010. We captured adults at

the nest site in June when nest site fidelity was high due to the presence of a chick. We collected morphometric measurements and attached leg bands, patagial tags and a GPS satellite telemetry unit to one of the adult nesting birds. We analyzed data for 4 of units (1 unit failed to transmit data) through 2009. We recorded 2,767 locations for the 4 units through 2009 and continue to analyze the data. All 3 birds that received transmitters in 2009 died during the harsh 2009-2010 winter. We believe that extreme cold and deep snowfall caused or contributed to the mortality of these birds. Necropsy results are pending. The data analyzed through 2009 revealed that adult vultures used large foraging areas, covering a mean minimum convex polygon home range of 27,025 ±11,922 SE km^2, a mean 95% kernel home range of 4,953 ±1,596 SE km^2, and a mean core home range (i.e., 50% kernel) of 526 ±168 SE km^2. Ongoing leg banding and patagial tagging data for juveniles demonstrates large nomadic movements away from Mongolia, with several documented sightings in South Korea. However, with limited data, it appears that breeding adults remain in Mongolia near their nesting sites, but we require more data to substantiate this premise. We will incorporate additional data analyses on the movements of the adults through April 2010 and the necropsy results of the 3 deceased birds for this paper.

SPATIAL AND TEMPORAL PECULIARITIES OF RAPTOR MIGRATION IN THE SOUTH BAIKAL MIGRATORY PASS

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The South Baikal migratory pass is situated along the western bank of Lake Baikal, and is most active in autumn. Despite other local raptor fly ways known in the region (Mel'nikov et al. 2000), this one is the most permanent and powerful, and is a good point for bird watching and regional monitoring on birds of prey in the Baikal region. Some data about bird numbers, species composition, and their dynamics have been published (Durnev et al. 1996, Fefelov et al. 2004, Alexeyenko et al. 2009 *in press*) but the bird distribution and migration dynamics requires more presentation for details. The pass is formed of three main factors: the lake itself, which birds of prey coming to from N/NW avoid to cross; southern slopes along the western bank, forming ascendant thermal air currents; and high abundance of migratory passerines as prey for sparrowhawks, etc. Coming to the lake, migrants turn to move along the bank to the S/SW, and form a maximum concentration at the southern most part of the lake near Kultuk (the main point of our observations). In total, 7616-14639 raptors of 22 species were counted in five fully-covered seasons, i.e., 1996, 1998, and 2001-2003 (average 130-276, maximum 816-1893 birds per day). Then birds move to the S/SE across the Khamar-Daban mountain range, and likely SW, going to Mongolia. However, their routes

after Baikal are only presumed with the only exception of young Imperial Eagles tracked with satellite transmitters in 1998 and 1999 (Ueta, Ryabtsev 2001). In cloudy weather, many birds, especially Oriental Honey-buzzards, cross the south part of Baikal over water. However, usually raptors migrate along the banks at a distance of 2-3 km from the shoreline and at an altitude of 300-500 m (to 1 km) above the Baikal water table. Daily dynamic chart is symmetrical on sunny days, with a maximum about midday (14:00-15:00), but has lower left "shoulder" on cloudy days due to lower speed coming to the corridor in the morning or lower number of birds involved in migration. On rainy days there is virtually no migration. Generally, the migratory tactic of raptors is very variable depending on local weather. Average speed during flight along the pass (ca. 25 km/h) is more than outside the pass, and local speeds may reach 65 km/h. Three migration periods are apparent: late August to 12-13 September (ca. 30% of all migrants), remainder of September (65%), and October (3-5%). Five to seven migratory peaks are recorded per season. Bird numbers vary significantly between years (CV = 15-33% in Eastern Buzzard, Black Kite, Goshawk and eagles, and 82-96% in Sparrowhawk and Oriental Honey-buzzard), but daily numbers within the season show high positive correlations between all "soaring" species. Likely their migration in the corridor is determined by general weather conditions in the area where the raptors are concentrated from and flying across. It remains to produce a spatial model of the birds collecting in the pass, based on the obtained data, and bird tracking is most important.

2008 AUTUMN RAPTOR MIGRATION AT RADAR HILL, PRACHUAP KHIRI KHAN, THAILAND

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A new autumn raptor migration site, Radar Hill in Prachuap Khiri Khan, southern Thailand was discovered in 2005 and a long-term count was established at this site in autumn 2008. Thirteen seven-day counts between late September to early November found 129,123 raptors of 20 species and the highest number in one day was 28,354 raptors on October 27. The most common migrant was Black Baza *Aviceda leuphotes* (81,315 birds), followed by Grey-faced Buzzard *Butastur indicus* (24,436 birds), Chinese Goshawk *Accipiter soloensis* (10,130 birds), Oriental Honey-buzzard *Pernis ptilorhynchus* (8,049 birds) and Japanese Sparrowhawk *Accipiter gularis* (1,655 birds). Also recorded as migrants were 157 Crested Serpent-eagles *Spilornis cheela* and 1,199 Shikra *Accipiter badius*. Rarities included Jerdon's Baza *Aviceda jerdoni,* Eurasian Sparrowhawk *Accipiter nisus*, Common Buzzard, Eastern Buzzard *Buteo buteo japonicus* and Steppe Buzzard *B. b. vulpinus*, as well as Northern Hobby *Falco subbuteo*. The number of raptors peaked during 11.00 am – 12.00 pm and 3.00 – 4.00 pm, with 19,580 and 19,573 birds respectively.

EFFECTS OF COLD FRONT PASSAGE ON MIGRANT RAPTORS AT SHIRAKABA PASS, NAGANO PREFECTURE, JAPAN, AUTUMN 2000–2009

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Japan has a high rate of cold front passage from the Pacific Polar Frontal Zone. The passage of a cold front could provide beneficial conditions for fall migration in the East Asia Oceanic Flyway with the occurrence of north-northwest tail winds. Furthermore, deflective updrafts form when northwest winds strike mountain ridges. Previous studies show a positive correlation with peak migration days and cold front passage along the Transamerican Flyway Eastern Corridor. We hypothesized that a similar phenomenon occurs within the East Asia Oceanic Flyway along the Hida Mountains in central Japan. This study utilized hawk watch records from Shirakaba Pass, Nagano Prefecture, Japan and historical weather data from Matsumoto Airport during the autumn of 2000-2009. The passage of a cold front was defined by dramatic changes in temperature (≥5°F average temperature), as well as a rise in average sea pressure. The number of Grey-faced Buzzard (*Butastur indicus*), Eastern Honey-buzzard (*Pernis ptilorhyncus*), Common Buzzard (*Buteo buteo*), and Japanese Sparrowhawk (*Accipiter gularis)* migrants per day during the frontal passage and three days after were recorded according to species as a gauge for effects of frontal passage. Data were analyzed with Kruskal-Wallis test. Test results demonstrated no difference during days with frontal passage compared to days without in 2000-2009. Therefore, no significant relationship between cold front passage and autumn migration is apparent. Other factors, such as wind speed, may partially determine migration bursts due to species specific flight strategies.

RAPID ADVANCES IN THE SPRING PASSAGE MIGRATION TIMING OF THE STEPPE EAGLE *(Aquila nipalensis)* THROUGH ISRAEL

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The aim of the study was to examine phenological change in the spring migratory passage of the predatory Steppe Eagle *Aquila nipalensis* from 1977 to 2008. Data were collected on the edge of the Negev Desert at Eilat in Israel, a globally important site for migrating raptors. Changes in the observation dates of spring passage migration were examined using correlation and regression to assess changes over time, and potential relationships with temperature and with an index of climate in the wintering area. Over the study period the number of recorded Steppe Eagles decreased significantly, as did the proportion of juveniles. Despite the population decrease there was a rapid advance in first spring passage date. Although changes in passage dates were related to environmental conditions in wintering and en-route areas, we suggest that one possible additional reason for such a rapid advance is due to competition between individuals for breeding territories due to dwindling habitats. Furthermore we discover that changes to some aspects of the passage distribution may be an artifact of a changing age structure.

THE AMUR FALCON (*Falco amurensis*) SATELLITE TRACKING PROJECT

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If one species can claim the title for undertaking the most arduous of all raptor migrations, it is the Amur Falcon, which is a complete transcontinental, transequatorial, long-distance flocking migrant with an approximately 22,000-km annual round-trip. The principal breeding and wintering ranges are separated by both 70° of latitude and longitude. Migrating birds apparently leave their 3.8 million km^2 northeastern Asian breeding range

and travel to northeastern India and Bangladesh, where they fatten up while staging for overland flights over peninsular India. This species is believed to then undertake the longest regular overwater passage of any raptor as it crosses the Indian Ocean between southwestern India and tropical East Africa, a journey of 2,000-4,000 km, which would also include nocturnal flight. If indeed this happens its migration is far and away the most oceanic of any bird of prey. Birds arrive in their southern African winter range in November-December and depart by late February until early May. This species is an "elliptical migrant", and its return route back to its breeding area is probably largely overland and to the north and west of its southbound route. In autumn after its long flight from the Far East it is apparently finely attuned to the strong monsoon tailwinds, which results in its late arrival in eastern Africa. Recent observations in late November-early December in Ethiopia suggest however that there may be a regular overland passage for this species at a higher latitude than had been previously thought. In a joint effort the World Working Group on Birds of Prey (WWGBP), Microwave Telemetry, Inc., BirdLife Northern Natal and the Migrating Kestrel Group of the Endangered Wildlife Trust started a satellite tracking program to study the almost unknown migration routes and other aspects of the biology of this little known raptor species. At a 26,000-strong roost in Newcastle, South Africa, birds were trapped in January 2010 using high altitude mistnets. From a total of 45 birds caught over a period of five days, 10 adult birds were selected according to age and body mass for fitting with 5 g experimental solar-powered satellite transmitters (PTTs) manufactured by Microwave Telemetry, Inc. Tracking of the Amur Falcons yielded already new information regarding the range of movements in their southern non-breeding grounds within little time. Previously unknown long-distance movements when wintering far in excess of what was expected were recorded. It is hoped that these tiny PTTs will enable us to reveal the undescribed spring and autumn migration routes. The initial overland leg of travel in autumn presumably occurs only by day. The supposed several thousand kilometer over-water leg, however, by necessity involves both day- and nighttime flight. The species' return migration is even less well understood, e.g. whether the birds pass north or south of the Tibetan Plateau, or fly directly across, awaits to be recorded.

POPULATION THREATS AND CONSERVATION

A REVIEW OF RECENT KNOWLEDGE OF DIURNAL RAPTOR SPECIES IN SUMATRA: A FIRST STEP TO CREATE A LONG-TERM MONITORING PROGRAM TO SAVE TROPICAL FORESTS IN SUMATRA, INDONESIA

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In terms of raptor species Indonesia, an archipelagic country with about 18,000 islands spanning the Indomalayan and Australotropical regions, is among the richest and the highest in endemism in the world. Some 70 species of raptor inhabit the country (Sukmantoro *et al.* 2006) and 16 out of 75 are endemic (Bildstein 1996). This paper focuses on the island of Sumatra for several reasons. First, the island was hardest hit by the 2004 tsunami in which some small island endemic raptors need confirmation (*Spilornis abbotti, Spilornis asturinus,* and *Spilornis sipora*). Simeuluë island in Sumatra is home to the endemic *Spizaetus vanheurni*. Sumatra is also the main habitat for two Indomalayan species: *Spizaetus alboniger* and *Spizaetus nanus* and Nias island is considered to be home of its subspecies *Spizaetus n. stresemanni*. Another Indomalayan species of raptor is the tiny *Microhierax fringillarius*. Second, the island is the pathway of northern migratory raptors (18 species) but because data and information on the migrants is very limited, it is necessary to further study the migrants over Sumatra, particularly the use of local habitat and their stopovers. Thirdly, a long-term conservation strategy and monitoring of raptors and their habitats needs to be implemented in Sumatra to help save the existing tropical forests, and with 34 species of raptor we see a great opportunity to use raptors as umbrella and flagship species for this strategy. The purpose of this paper is twofold. First we will present the more significant records of raptor species compiled from recent references and field observation in Sumatra. The review is based on our literature study, personal communication with raptor experts visiting the island, and opportunistic field observations carried out from 2000-2009. We reviewed 34 species of raptors recorded to occur in Sumatra (previously 32). There were two new records of species and accumulative stopovers of the migrants. Second, we explore recent knowledge of diurnal raptor species in Sumatra that we can use to prepare long term monitoring activities in support of conservation of Sumatran tropical forests.

RAPTORS OF NAGPUR CITY IN VIDARBHA REGION OF MAHARASHTRA STATE, INDIA

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We conducted surveys, which included random observations, to assess the avian biodiversity in and within 25 km of Nagpur city (21^{0}10'N and 79^{0}05'E) in Vidarbha part of Maharashtra state, India, during the period 2005 to 2010. Various habitats including dry deciduous forests, scrub forest, wetlands, and agricultural cultivation were visited to observe the presence of raptor species. The surveys revealed the presence of 27 species of raptors in the study area. These included, five species of *Circus* and *Falco* each, three species of *Accipiter*, three species of vultures, viz., *Neophron percnopterus, Gyps bengalensis* and *Sarcogyps calvus*; and other raptors including *Pernis ptilorhynchus*, *Butastur teesa*, *Buteo buteo*, *Circaetus gallicus gallicus, Hieraaetus fasciatus, Ictinaetus malayensis, Elanus caerulus, Milvus migrans govinda, Spilornis cheela melanotis, Spizaetus cirrhatus* and *Aquila rapax*. Also, the survey showed that all three species of vultures have nearly disappeared from the study area. Of these species, 14 were resident, 8 species were winter migrants, 4 species were recorded as vagrants, and one species, Amur Falcon *Falco amurensis* was a passage migrant to the study area.

A HABITAT COMPLEX APPROACH TO SAVE JAVAN HAWK EAGLE (*Spizaetus bartelsi*) IN WESTERN PART OF JAVA: A CASE STUDY, GAP ANALYSIS, COMMUNITY PARTICIPATION, AND SYNERGISM

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Gunung Gede Pangrango National Park (GGPNP) covers an area of about 22,000 hectares, and its surrounding forested areas like Telaga Warna Nature Reserve (NR), Telaga Warna Nature Tourism Park (NTP), Jember NTP, several blocks of Protected Forest (PF), and other plantation areas (mainly tea plantations) make up a habitat complex for the Javan Hawk Eagle (*Spizaetus bartelsi*). This habitat complex used to be connected with Gunung Halimun Salak National Park (GHSNP), the most extensive natural habitat for the eagle and other raptor species occurring in the western part of Java Island (Kuswandono *et al*. 2003; Widyaningrum *et al*. 2004; and Supriyanto *et al*. 2008). We have identified that serious threats to the eagle in this complex include habitat loss caused by land conversion and hunting by local people (Prawiradilaga 1999 and Prawiradilaga *et al*. 2003). These threats have placed the Javan hawk eagle on the world's list of endangered species (IUCN 2006), meaning that the hawk eagle is facing a serious risk of extinction in the near future if no significant conservation action is taken. Therefore, and anticipating a possibly worse situation, we offer this paper proposing an approach and techniques to conserve the hawk eagle and other raptors at the ecosystem level. This approach is quite different from existing conservation actions, which are site based and fragmented. We recognise two conservation management approaches: 1) habitat level, and 2) species level. This approach will effectively conserve the existing fragmented and less protected forest blocks as well as boost the participation and synergism of many stakeholders. Further, by using this approach, a gap in conservation management among local conservation agencies will also be discussed for the benefit of the hawk eagle's conservation in particular and for biodiversity in general.

RAPTOR SANCTUARY: A COLLABORATIVE SCHEME FOR RAPTOR CONSERVATION AND HABITAT PRESERVATION IN INDONESIA

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Using raptors as "flagship species" to develop more effective conservation strategies for forest or wildlife habitat protection is defined as "ecologically justifiable" (Newton *et al.* 2006). Generally, raptors are known as very charismatic species and their existence in nature indicates viable habitats and forest ecosystems, and often represents good primary forest condition. To support efforts on raptor conservation, raising awareness among stakeholders and the general public is necessary to develop understanding of the important role of raptors in the ecosystem. Several approaches can be developed to raise public awareness, such as raptor rehabilitation and release programs, environmental education activities, and ecotourism. Based on this understanding, some institutions have shared ideas to establish a collaborative institution named Suaka Elang (Raptor Sanctuary). The establishment of Suaka Elang was the result of collaboration between governmental organizations, NGOs, and corporations. Suaka Elang is expected to contribute actively to raptor conservation strategies and efforts, particularly in Java Island, and generally in Indonesia. Since its establishment in November 2008, Suaka Elang has developed activities and programs, such as: release and monitoring a Javan Hawk Eagle (*Nisaetus bartelsi*) and a Crested Goshawk (*Accipiter trivirgatus*), developed raptor conservation-based environmental education programs, and enhanced public and stakeholders' capacities through training and seminars. As a collaborative institution, Suaka Elang has unique and effective approaches to implement and execute its program and activities, which are either handled directly by Suaka Elang or separately by each partner. In the future, Suaka Elang is expected to become one example of how to implement an effective strategy of raptor conservation through collaboration between stakeholders.

THE ASSESSMENT OF HIGH RISK UTILITY LINES AND CONSERVATION OF GLOBALLY THREATENED POLE-NESTING STEPPE RAPTORS IN MONGOLIA

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Saker Falcon (*Falco cherrug*), Lesser Kestrel *(Falco naumanni),* Common Kestrel (*Falco tinnuculus*), Upland Buzzard (*Buteo hemilasius*), Steppe Eagle (*Aquila nipalensis*) and Golden Eagle (*Aquila chrysaetos*) are threatened species that are listed in Appendices I/II of CITES and CMS. Steppe raptors prefer to nest on concrete and wood poles and pylons of high power electric lines in the country. Power lines are designed for transmission (110 and 220kV) and distribution lines are therefore different in terms of pole structure. However, old and unfriendly structures for nesting birds are one of the reasons for high mortalities of raptors and other birds caused by electrocution and collision. We conducted field research work on 110, 220 kV transmission lines, and 6, 10, 15, 35 kV distribution lines, located in Tuv, Dundgobi, Gobisumber, Dornogobi, and Khentii aimags of Central Mongolia from 2007 to 2009. A total of 207 individuals belonging to 13 globally threatened raptor species died in the study area caused by electrocution and there was a trend of an increase in mortality. The number of dead birds by collision was lower than electrocution. However, in 2008, a great number of Pallas's Sandgrouse collided and died on unusual seasonal movement in our study area. The reason for this high mortality of electrocution is the structure of tangent and strain poles with grounded steel cross arms of 6 and 10kV lines, and tangent and strain poles with upright insulators and grounded steel cross arms and strain poles with jumpers above the cross arm of 15kV lines. An increase in spike numbers on high voltage lines causes an increase in mortality. In addition, jumper wires over the top of poles and cross-arms increase the mortality of birds. Recent protection measures (spikes, tapes, fans) taken by electricity companies are inefficient for bird protection in the country. It is necessary to put wire markers and diverters, such as flags, balls, which are visible for birds from a long distance, based on our results that show the distance of the wire markers from the poles should be variable, depending on the type of power lines. There is a need to take immediate measures in order to solve 15kV line issues to protect birds from death, which is a serious concern on a national and international level.

ILLEGAL HUNTING OF MOUNTAIN HAWK-EAGLES IN SOUTHERN TAIWAN

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This study investigated the pattern of illegal hunting of the Mountain hawk eagle (*Spizaetus nipalensis*) by local people in southern Taiwan. With this information a better understanding of its impact on the bird's population trend can be attained. A total of 150 hunters were interviewed from seven aboriginal townships during 2004-2007. Of them 55 (36.7%) claimed they once hunted the bird in their lives. The number of eagles captured per hunter who did the hunting ranged from one to 220 eagles. Hunting mostly happened at Laiyi and Chunrih Townships, Pingtung County, and at Daren and Jinfong Townships, Taitung County, where birds were mostly caught by trapping with steel jaw traps. In the 1950s-1960s, the estimated amount of eagles caught was <5 birds/year, increasing since then and reaching a high (40.2 birds/year) in the early 2000s when unemployment rate soared. Trapped birds were mostly sold for feathers used by tribe leaders.

CONSERVATION THROUGH SUSTAINABLE USE – A PROMISING WAY TO SAVE SAKER FALCON *(Falco cherrug)* POPULATIONS

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The Saker Falcon *Falco cherrug* is an iconic bird of prey in traditional Arab falconry culture. Because of that there is a significant demand for Saker Falcons in the Middle East, which is largely met by international legal and illegal trade. The Mongolian government openly and officially exports the species each year based on an agreed quota since 1990s. However, the scientific basis for this quota was unclear and the trade has been subject to review and suspension by CITES. The main objective of our research in Mongolia is to monitor the wild Saker Falcon

population and develop a science-based conservation model for sustainable use of wild Saker Falcons that meets CITES criteria. An underlying principle of conservation through sustainable use of wildlife resources is that there should not be any detrimental impact on the population being harvested. Furthermore, the concept also requires that the harvest benefits the local community so that there is a local incentive to conserve the species through sustainable use. Data collected through the Saker Falcon research program in the last several years showed that the Saker Falcon population in central Mongolia population is not-declining and there is a significant number of non-breeding birds in nest-site limited areas in the steppe region. We are developing a program to encourage those non-breeding birds by providing artificial nests, and to increase the size of the breeding population in these areas. The surplus birds produced from these artificial nest areas can be used to compensate the number of falcons taken out of the wild population. Our experimental project has tested whether artificial nests can be used to increase the breeding population of Saker Falcons in nest-site limited habitats and to develop a system whereby the productivity of these nests can be used to set a sustainable harvest quota. Local herders can also benefit from this program through the development of international social community links, providing ecotourism services for visitors visiting artificial nest areas, and helping researchers to conduct the monitoring.

PRIORITIES FOR THE CONSERVATION OF THE SAKER FALCON

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The Abu Dhabi Environment Agency has supported research and conservation on Saker Falcons (*Falco cherrug*) since 1993. It has collaborated with various organisations throughout Central Asia, the Middle East and Eastern Europe to undertake field surveys, migration studies, re-introductions to the wild and artificial nest programmes. Given the fragmentary nature of our knowledge about this species, how should we prioritise our resources to help this species face the challenges of our fast-changing world?

BEHAVIOR, ECOTOURISM AND CHEMISTRY

EFFECT OF RAT BAITING ON RANGING BEHAVIOR OF BARN OWL (*Tyto alba javanica*) IN MALAYSIA

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This study investigated the effects of rat baiting on the ranging behavior of the Barn Owl *Tyto alba javanica* in immature oil palm plantations under three different rodenticide applications. Four treatment plots were established in the FELCRA oil palm plantation in Seberang Perak, Malaysia. Three plots were baited each with first generation anticoagulant (warfarin), second generation anticoagulant (brodifacoum) and a protozoan based biorodenticide, *Sarcocystis singaporensis,* plus a fourth non-baited control plot. There were three rat-baiting campaigns carried out every six months, in, September 2008, March 2009, and September 2009, and radiotelemetry was conducted during the third baiting campaign. A pair of *T. alba* from each plot were tagged with radio transmitters and tracked twice, before and after baiting, which coincided with the owl's breeding season in oil palm. The first radio telemetry session commenced at the onset of the mating season and the second session when the owls were brooding their young. Radio locations were plotted on a 1:66 scale map. Radio tracking data was analysed with the help of the software BIOTAS using the fixed kernel estimator method which requires a minimum of 50 radio fixes to determine home range size. Prior to the third baiting campaign, the home range sizes of *T. alba javanica* in the chemical rodenticide treated areas were consistently larger than the biorodenticide and non-treated control areas. For females the home range sizes were 57.98 ha, 104.65 ha, 143.12 ha and 167.27 ha for the control, biorodenticide, warfarin and brodifacoum treated plots respectively. The corresponding home range size for males were 33.30 ha, 26.65 ha, 63.97 ha, and 147.30 ha respectively. There was no significant difference between the home range size of males and females during the mating period (*t-test; p= 0.217*). Home range size of *T. alba javanica* changed dramatically during the second radiotelemetry session. The home range size of *T. alba javanica* in chemical rodenticide treated areas were larger than non-treated and the biorodenticide treated plots for both males and females. The home range size for males were 287.75 ha, 336.09 ha, 352.47 ha, and 384.17 ha for the

control, biorodenticide, warfarin and brodifacoum treated plots respectively. The corresponding home range size for females were 24.34 ha, 34.23 ha, 38.56 ha, and 51.98 ha respectively. During the brooding of the young, the home range sizes of males were significantly larger than females (*t-test; p<0.01*). The home range size of females when breeding season started was significantly larger than during the brooding of the young period (*t-test; p<0.05*). In contrast, males exhibited a significantly larger home range size during the brooding period compared to the period of the onset of mating (*t-test; p<0.01*). In the chemical rodenticide treated areas, rat prey were not sufficient and *T. alba javanica* had to engage in greater exploratory flights resulting in larger home range size to secure enough food to meet their energetic demands. The consistently larger home range size of females during the onset of mating in all plots reflected the active searching for prey by females to accumulate substantial body fat reserve in preparation for nesting and incubation period. Sufficient fat reserve is crucial to produce a viable clutch size and to improve reproductive output. Smaller home range size of males compared to females at the onset of mating in all plots can be attributed to the former hunting only for individual metabolic requirements. However, during brooding of young, males were more actively engaged to bring adequate prey for the female and her brood, while the latter spent their time in and around the nest. These findings suggest the home range size of *T. alba javanica* is not only influenced by rodenticide application which reduces rat prey but also changes throughout the course of the breeding season to meet their changing energetic requirements.

OWL PREDATORY BEHAVIOR AND RESPONSES TO PREY ABUNDANCE: TOWARDS AN ECOLOGICALLY-BASED AGRICULTURAL PRACTICE

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Although Barn Owls (*Tyto alba javanica*) were once considered as vagrants, they are now the most common owl species in Malaysia. Their proliferation is largely due to expansion of agricultural lands in which prey is abundant and nest boxes are made available for them to roost and breed. However, their role in regulating rodent populations is not fully understood and chemical control of rodents is currently being used in most plantations, leading to other environmental problems including secondary poisoning and bait resistance. This study aimed to

detect differential predation and functional and numerical responses of barn owls to changes in prey abundances, which are important determinants of effective biological control agents. In over 25,200 trap-nights in an oil palm plantation, a total of 1,292 individual rats were captured; these were mostly *Rattus rattus diardii*, followed by *Rattus argentiventer* and *Rattus tiomanicus*. Based on 203 owl pellets collected, the birds fed primarily on rodents, mostly on *R. r. diardii,* the most frequently trapped species. There was no clear selection of prey by barn owls with respect to size and sex of prey. There was a significant positive relationship between the relative abundance of rats and the number of owl pellets collected, and higher rat abundances during the owls' breeding months. This suggests a functional and a numerical response of barn owls to changes in prey abundance. Although without differential predation, barn owls could provide successful biological control of rodents is supported by their functional and numerical responses to prey numbers. This should be properly accounted for in ecological-based management of agroecosystems considering the adverse effects of chemical usage.

RAPTOR ECOTOURISM PROGRAM IN RIAU PROVINCE

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Riau Province has a very rich biodiversity, especially in terms of flora and fauna including raptors. Several target locations in Riau are important raptor tourism destinations, for example, Rupat Island and Bengkalis Island for raptor migration observation, Tesso Nilo National Park and Kerumutan where numerous species are found in the lowland forest area such as Crested Serpent Eagle, White-shouldered Kite etc., and in the Rimbang Baling Wildlife Reserve which has typical mountain forest of Sumatra. WWF Indonesia has developed a study and ecotourism conservation initiative in and around Tesso Nilo. Ecotourism is expected to be important in saving the tropical rain forest there. From studies conducted by WWF, we identified at least 7 species of raptors in Tesso Nilo National Park, such as Oriental Honey-buzzard *Pernis ptilorhynchus*, Crested Serpent Eagle *Spilornis cheela*, Black Kite *Milvus migrans*, White Shouldered Kite *Elanus caeruleus*, Crested Goshawk *Accipiter trivirgatus,* Japanese Sparrowhawk *Accipiter gularis* and Black-thighed Falconet *Microhierax fringillarius*. Riau is an important province in Indonesia in terms of tropical rain forest due to the attention it receives from vandalism and criticism from various stakeholders about the lack of management of the tropical rain forest. An example is the destruction of forests by corporations, especially for palm-oil production, and forest fires. Since 2000, Riau Province has been the largest contributor to sharing "smoke" with Malaysia and Singapore. Ecotourism is one of efforts to reduce destruction of natural resources, and many people in Riau will gain benefit from the economic sectors and sustainable forest use.

SEASONAL VARIATION OF HEMATOLOGY AND BLOOD CHEMISTRY IN COLLARED-SCOPS OWL (*Otus bakkamoena)*

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The parameters of hematology and blood chemistry can be an indicator of an animal's physiological condition and to detect latent pathologies. These parameters may be affected by such factors as species, sex, and age. Our objectives were to provide baseline values of hematology and blood chemistry in Collared-scops Owl (*Otus bakkamoena*) and investigate whether there is a clinical fluctuation according to seasonal change. Packed cell volume(PCV), hemoglobin(Hb) and 11 blood chemistry parameters, including uric acid(UA), total plasma protein(TP), albumin(Alb), aspartate transaminase(AST), alanine transaminase(ALT), alkaline phosphatase(ALP), calcium(Ca), glucose(Glu), total cholesterol(TCHO), total bilirubin(TBIL), and amylase were determined from 33 adult Collared-scops Owls. Analysis of variance (ANOVA) was performed on the data to assess the association with seasons divided into spring (Mar-May), summer (Jun-Aug), autumn (Sep-Nov) and winter (Dec-Feb). Our study showed that body weight, PCV and TP had significant difference ($p<0.05$) in seasons between male and female. Mean body weights were heavier in winter and lighter in summer, PCV values progressively decreased from spring to summer, and the levels of TP were higher in spring and winter in both sexes. Hb significantly elevated in spring only in males, whereas ALT, ALP, TCHO varied significantly only in females. Females respectively showed the low level of ALT in the summer, the high level of ALP in the end of winter, and TCHO values were higher in spring and autumn. These results were attributed to the fluctuation of hormones in the breeding period and physiological needs. Our study set up the preliminary baseline and the seasonal variation of blood chemistry parameters which could be used as an indicator of the physical condition in Collared-scops Owl and expect to improve the validity of clinical diagnosis in the future.

Poster Presentations

NEST MATERIALS AS INFORMATIVE CUES FACILITATE NEST SELECTION IN A GROUP OF RAPTORS

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There is growing evidence that birds are able to track variations in local breeding habitat quality, and empirical studies have described many possible cues for breeding habitat selection, such as breeders' own reproductive success, information on environmental factors affecting breeding success, and information from conspecifics and interspecifics. In this study, we experimentally test whether the nest materials are used as cues to make breeding nest selection decisions in a group of raptors breeding inside nest boxes, by manipulating nest materials. Eight types of boxes, categorized according to nest materials and manipulated means were available; three types of boxes without nest materials, and five types of boxes containing different nest materials. Four species of raptors, Common Kestrel (*Falco tinnunculus*), Collared Scops Owl (*Otus lettia*), Ural Owl (*Strix uralensis*) and Oriental Scops Owl (*Otus sunia*) used nest boxes to breed in the study. The occupancy rate for boxes with nest materials differed significantly from that of boxes without nest materials (Mann-Whitney U: Z= -7.169, p = 0.000), rate of boxes with and without nest materials occupied by those raptors is 43.0 ± 3.0% and 7.6 ± 2.3% respectively. Three species of owls absolutely selected boxes with nest materials. The Common Kestrels selected all eight types of boxes, but the usage rate for eight types of boxes varied significantly (Kruskal-Wallis Test: $X^2 = 88.923$, df = 7, p = 0.000), and boxes containing conspecific old nest materials were selected more frequently, followed by artificial nest materials and Great Tits' (*Parus major*) nest materials. Twenty-three boxes used over two times were cleaned or replaced with new boxes, those boxes were used less, and with similar occupancy rate as boxes originally without nest materials. A total of 13 cases of interspecies nest usurpation in those raptors were observed, and all usurpation occurred in nests with nest materials. We suggest that the four species of raptors could use the presence of nest materials as cues to assess nest quality and to make optimal breeding nest choices.

SATELLITE TRACKING OF IMPERIAL EAGLES (*Aquila heliaca*)

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Four adult males, two adult females and two immature Imperial Eagles were trapped and fitted with satellite transmitters (PTTs) near Taif in Saudi Arabia while wintering. Most birds returned to the same wintering area year after year. Three of the eagles were trapped there for up to three times. Six eagles were tracked to their summer home ranges and in most cases back again to Arabia. Four birds migrated to Russia in spring, one to Kazakhstan and one to China. The distances between the sites used in the summer and the wintering areas ranged between 3,900 and 5,000 km. One male, caught in March, was found breeding in Bashkiriya (Russia) at 55°57' N west of the Ural Mountains at the northernmost perimeter of the known breeding range in European Russia. The bird was caught a second time in the wintering area in November wearing the transmitter which was still functioning. In January, two years later it was caught for the third time, but the PTT had been lost. A four year old female, still in immature plumage, weighed 4,800 g. It was much heavier than any previously known individual of this species. In spring it migrated to China.Its home range in the summer was in Xinjiang Province in north-western China close to the borders of Mongolia and Kazakhstan. It had the longest migration route of all the eagles tracked, over 5,000 km, and in the most east-westerly direction. After its second tracked wintering in Arabia it again took the same route towards China, but contact was lost shortly before it was presumed to have arrived there for the second time. The last adult bird which was trapped was fitted with a GPS tag which made it possible to study its wintering behaviour in great detail. Its home range was 5,900 km² in area with a diameter of up to 127 km. It was most often on the wing between 15.00 and 17.00 hrs (local time).

MIGRATION STRATEGIES OF 16 STEPPE EAGLES (*Aquila nipalensis*) TRACKED BY SATELLITE

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Sixteen Steppe Eagles of different ages and both sexes were trapped on migration and on their wintering grounds and fitted with satellite transmitters (PTTs). They were tracked for up to over a year and for up to 17,100 km. All those eagles which could be tracked to their breeding areas spent the summer in Russia and Kazakhstan, just east of Lake Aral (63°16‘E). Two adults, however, possibly originated from east Kazakhstan or even west Mongolia, as indicated by the direction of the first part of their homeward stretch up to the breaking off of contact. We calculated the minimum distances covered by the birds we tracked from their wintering grounds to their breeding areas. For the seven individuals whose spring migration was fully plotted, these ranged between 3,489 and 9,738 km. Immature and adult Steppe Eagles adopted markedly divergent strategies with regard to the periods of migration. The immature birds stayed substantially longer on their wintering grounds (ca. six months), and clearly much less time in the breeding grounds than the adults, leaving for home considerably later. There was a lapse of over 1.5 months between the arrival of adults and immatures in the breeding areas. The adults arrived between 26 March and 2 April whereas the immature eagles arrived by mid-May. The spring migration took between 28 and 54 days (mean 40 days). The eagles overwintering furthest away from their breeding areas needed more time than those wintering a comparatively short distance away in spite of their greater speed. The adult wintering furthest away could thus spend only a little over two months in its winter quarters in Botswana, whilst those wintering in Arabia spent around twice as much time there. The 9,543 km spring migration of this adult, from Botswana to Kazakhstan, took almost eight weeks, covering a daily average of 177 km. The longest average daily flight distance among all tracked individuals was around 355 km. A non-breeding immature female spent only just over three months, from 18 May to 27 August, in its summer quarters east of the Volga. However, even the time spent by a successfully breeding female in its nesting territory also seemed brief, lasting only from 1 April to 22 August. Thanks to a large number of locations the summer movements of an immature female could be analyzed in detail, using only good quality fixes. The heart of the core area which it principally occupied was at 50°25‘ N 47°06‘, 130 km ENE of Kamysin on the Volga, and was about 100 sq km (100 % outer edges) in extent. Between 17 July and 11 August, it apparently never left the area. For the rest of the time a substantially larger area was used, extending over 7825 km² (100 % outer edges). For three adult females the following home range sizes could be assessed, using only good quality locations: 172 km² (100% outer edges) (28.3.-11.6), 227 km² (1.4.-22.8) and 31 km² (2.4.-25.7).

A SURVEY OF THE VULTURE EATING COMMUNITY IN THE VIDARBHA REGION OF MAHARASHTRA STATE, INDIA

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A survey of the vulture eating "*Phasepardhi*" community in the Vidarbha region of Maharashtra state in India was carried out during the period of 2008 to 2010. Various ghettos of the *Phasepardhi* community in Vidarbha region were visited during this period. A questionnaire was prepared for the survey, asking for information on various aspects of the vulture eating habits of the *Phasepardhi* community. A pictorial bird book was used for identification of the various vulture species consumed by the community people. The data collected from distant community members was cross-checked for validity. The *Phasepardhi* community was labeled as a "criminal" community in the pre-independence period. Though the community is improving to some extent, the study found that they continued devouring vultures till the vultures were nearly wiped out from the region. The study helped in making a comprehensive checklist of the names of birds in the dialect spoken by this particular community in the study area. Also, the study pointed to the grim reality that many members of the community still survive on poaching of wild birds and animals. The community misses the vulture meat, which they loved very much. The community members identified four species of vultures, viz., Egyptian Vultures *Neophron percnopterus*, Long-billed Vultures *Gyps indicus*, White-rumped Vultures *Gyps bengalensis* and Red-headed (King) Vultures *Sarcogyps calvus*. The present paper discusses the results of the survey which estimate that the community could have been responsible for killing and eating thousands of vultures in the study area. This could have been one of the important but neglected factors, though not the sole factor, responsible for the dwindling vulture population. It was also found that the community had a very good knowledge of nearly 100 species of birds and used different techniques to trap different species of birds.

RESCUE OF KNOWLEDGE OF THE JAVAN HAWK EAGLE ON MT MERAPI VOLCANO, INDONESIA

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The project "Rescue of knowledge of the Javan Hawk Eagle (JHE) on Mt. Merapi volcano, Indonesia" was conducted between January-June 2009. Main activities of the project include: 1) public training about JHE and other raptors, 2) Merapi Volcano's JHE Survey and 3) Campaigning for JHE conservation on multiple blogs and through mass media. JHE training was carried out over three days (January'17th-19th 2009), 39 people participated and four expert speakers presented: Adam Supriatna (Raptor Indonesia leader), Usep Suparman (Raptor Society Centre), Pramana Yuda (expert Indonesian ornithologist, lecturer at Atma Jaya University, Yogyakarta) and Lim Wen (Expert Raptor Watcher). The JHE survey on population and breeding activities as well as other behaviors was carried out with more than a hundred participants in January-June 2009. Three individual JHEs at the south slope of Merapi Mount were identified by point count method. Their behaviors such as breeding and feeding were well documented in film, photographs and notes. In June and early July, we gave more attention to a documented JHE nest, which was active despite not having any chick yet. Information was recorded on copulation, activities on collecting nest materials and feeding on the nest. Incubation period started in July 2009, but unexpectedly, the chick hatching failed. It was gone probably due to a monkey attacking. We will compile all data about Merapi's JHE and will publicize it on our weblogs. Now we have 109 contacts on kibczone.multiply.com. Campaigning about JHE conservation on multiple blogs and through mass media is going very well. Hundreds of people participated in the JHE street-campaign in Yogyakarta's public area. We released one individual JHE in the south slope of Mount Merapi, rescued from animal trading so this bird could fly free in suitable habitat on April '25th 2009. Those accomplishments may become a motivator for further activities to conserve the Javan Hawk Eagle (*Spizaetus bartelsi*) in Java island of Indonesia.

THREATS TO THE OWLS ON JAVA ISLAND, INDONESIA

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Indonesia has about 45 species of nocturnal raptors from two families: *Tytonidae* and *Strigidae* including 23 species which are endemic. Java Island, one of the biggest islands in Indonesia, has 11 owl species (25 % of the total number of owls in Indonesia), three of which are endemic to Java Island: Javan Scops Owl (*Otus angelinae*), Javan Owlet (*Glaucidium castanopterum*) and Spotted Wood Owl (*Strix seloputo seloputo*). All owls on Java Island are included in CITES, appendix 2. Ironically, these nocturnal raptors' diversity and endemism faces a serious threat from illegal trading in this country - which is believed to be the third largest in the world after that of Brazil and Zimbabwe, shooting of owls as a hobby or for food and changes in land use. From January to March 2010, I conducted a survey and investigation in some areas of Java Island. I found the shooting of owls in Parung (West Java), in Purwokerto (Central of Java) and in Tuban (East Java) and I found illegal trading of owls in Pramuka and Jatinegara bird market, Jakarta. The methodology of survey is "undercover".

SPATIAL ANALYSIS OF RARE AND THREATENED RAPTOR DIVERSITY: EMPIRICAL BASE FOR ESTABLISHING CONCEPTUAL FRAMEWORK AND POLICY GUIDANCE IN BIODIVERSITY CONSERVATION

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Breeding period is a critical phase for raptors that at present are categorized as rare and threatened species. In relation to this, a spatial analysis has been undertaken to assess the relationship between landscape structure and the occurrence of nest predators in the landscape of Panaruban. The result suggests that the landscape of Panaruban is a mosaic consisting of natural and artificial

vegetation of different structure that has resulted in high landscape heterogeneity which facilitates four species of raptors to co-exist. In general, landscape heterogeneity in sites where nests were built appears to be similar. The four species of raptors tend to select a nesting site that has a low degree of landscape contrast. Landscape connectivity in sites where the four species of raptors built their nests to some extent exhibits a difference. However, in terms of landscape complexity, there is no great difference among the nesting sites. The four raptor species tend to build their nests in places with various topographical conditions.

SPATIAL DISTRIBUTION AND HABITAT OF ORIENTAL HONEY-BUZZARDS WINTERING IN BORNEO BASED ON SATELLITE TRACKING

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Knowledge about the spatial distribution of wintering habitat of migratory raptors is a prerequisite for understanding their wintering ecology, physical habitat characteristics, as well as managing their habitats. Oriental Honey-buzzards (*Pernis ptilorhynchus*) migrate very long distances from the breeding sites in Japan to the wintering sites in Southeast Asia. Nowadays, satellite tracking of migratory raptors is a powerful research tool to provide migration route, stop over and wintering habitat data. We have satellite-tracked 49 Oriental Honey-buzzards since 2003. The wintering sites were distributed in the Philippines, Malaysia, Indonesia, and East Timor/Timor-Leste. About 47% of individuals tracked have used Borneo as their wintering site. As a result, Borneo became the focal study area to initiate the study about the wintering habitat characteristics of the species. The presence data obtained from satellite tracking will be used for estimating the Oriental Honey-buzzard home range during their stay in the wintering habitat. Comparisons between the minimum convex polygon and the fixed kernel home range were used for investigating as close as possible to the real home range size occurred in wintering habitat. The results will be shown on the spatial distribution of Oriental Honey-buzzard's wintering throughout Borneo. In total, all home ranges calculated by 100% minimum convex polygon, 95% and 50% of fixed kernel covered about 215386.7 km^2 (29.1%), 153463.4 km^2 (20.7%), and 27528.3 (3.7%) of Borneo area, respectively. Overlay with the several physical variables (i.e. land cover, slope, elevation, and climate) will characterize the general pattern and characteristics of Oriental Honey-buzzard's wintering habitat.

HABITAT SELECTION PATTERNS OF RELEASED EAGLES IN PANARUBAN AREA, MOUNT TANGKUBAN PERAHU, WEST JAVA, INDONESIA

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During 2006-2008, Raptor Center Indonesia released 13 confiscated eagles in the Panaruban area, including 2 individuals of Javan Hawk-eagle *Spizaetus bartelsi*, 6 individuals of Changeable Hawk-eagle *Spizaetus cirrhatus* and 5 individuals of Crested Serpent Eagle *Spilornis cheela*. Monitoring of those released eagles was conducted from June 2006 - June 2008 by using visual observation and radio telemetry methods. From the location records on released eagles in the Panaruban area, cultivated forested area is the habitat most used by those eagles (46%), followed by plantation area (26%), natural forested area (22%) and residences (6%). Habitat used by each individual of released eagles was determined by characteristics and behaviours of the bird on selecting its habitat. Some factors, both internal and external, have played a part in habitat selecting.

BREEDING HABITAT USE OF GRAY-FACED BUZZARD (*Butastur indicus*) IN NORTHERN JAPAN

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The Gray-faced Buzzard is a typical migratory raptor species in East Asia. It breeds in northeastern China, the Korean Peninsula, and Hokkaido Island, Japan), and winters in southwestern Japan and Southeast Asia. The buzzards prefer to breed in the *yatsu* valleys that consist of irrigated rice paddies and secondary forests. They nest in mature pines or Japanese cedars. They were listed as vulnerable in the Ministry of the Environment's Red List of Threatened Species

in 2006 in Japan, and the rapid decrease in their population is a source of concern. They feed on frogs, snakes, insects and a variety of other small animals. This study was designed to contribute to our understanding of the habitat use of this species in the northern limit where they can breed. The study area was located in Hanamaki, Iwate Pref., Japan. The survey was conducted from early May until the middle of August, 2007. We used radio-telemetry to estimate home ranges of 4 adult male buzzards during breeding season and recorded foraging locations we categorized as the following: (1) canopy, (2) grassland, (3) bank, (4) farm road, (5) orchard, (6) upland field, (7) abandoned rice paddy, (8) fallow field, (9) levee, (10) rice paddy. We also studied their land use patterns on each point in 7 control areas. Once a week we measured the height of grass and vegetation cover rate in inclusive study areas. The home-range sizes for 2 males were 171.6ha and 93.5ha calculated using the 100% minimum convex polygon method. They hunted among the rice paddies in the first half of the nestling period, and mostly in woods thereafter. They preferred hunting in short grass areas regardless of vegetation cover rate. The average grass height was 10.4±7.9cm. The buzzards also preferred cultivated rice paddies where they sought visible prey easily, as opposed to abandoned paddies where weeds grow taller. The analyses indicate that vegetation condition affects their efficient foraging. This study has identified the following is necessary for biological conservation of the buzzard: (1) cultivated and weeded rice paddies, (2) woods that consist of both broadleaf trees where frogs and insects inhabit and coniferous trees where the buzzards nest. This work was supported by Grant-in-Aid for Scientific Research (C) (19510231).

GENETIC DIVERSITY AND POPULATION STRUCTURE ANALYSIS OF GRAY-FACED BUZZARD *(Butastur indicus)* IN JAPAN BASED ON mtDNA

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The Grey-faced Buzzard (*Butastur indicus*) is an endangered Accipitridae species living in East Asia. This poses an interesting question regarding both genetic diversity and population structure of this species. The purpose of this study is to evaluate the current status of the Buzzard using sequences of the mitochondrial DNA control region and its variation among individuals. DNA was obtained from their feathers or eggshells from some regions of Japan. To design some primer sets to amplify the control region of the Buzzard, we determined about 5 kb nucleotide sequences of mitochondrial DNA genome (cyt-*b*, control region, nd6, pseudo-control region). These gene orders were similar to those reported on other species. We sequenced and determined the mitochondrial DNA control

region on 33 individuals. Nine haplotypes were detected, and haplotype diversity and nucleotide diversity were 0.739 and 0.00353, respectively. Comparing these results with those of other species, it can be suggested that the Buzzard might escape the possibility of becoming extinct. Significant genetic distance was not detected among individuals. Two characteristic haplotypes were detected in Fukuoka. Additionally, as a result of phylogenetic analysis, it was indicated that the haplotype detected in Fukuoka was ancestral haplotype sequence of the Buzzard. These results suggest that it depends on different migration roots and it shows the evolution of the migration.

IRIS COLOR OF MOUNTAIN HAWK-EAGLE

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External morphology of the Mountain Hawk-Eagle, to report on the iris color. We studied individual measurements of iris color in wild individuals of Suzuka Mountains of Shiga Prefecture, Japan, including: chicks before fledging, post-fledging, juvenile, immature, and adult birds, as well as young wild birds in Kyushu, and an adult individual that had been bred in Kyoto City Zoo. We examined the iris color for 45 individuals. It was confirmed that iris color changes with age. There were three patterns: with chicks and fledgling the iris is gray, in young birds it is pale yellow, and in adults it is yellow. The iris color of fledglings, nestlings, and young birds (one year after fledging) is similar. The observations with the telescope, the iris color discrimination is difficult particularly for fledgling and young (one year after fledging) individuals. The individual reached one year after fledging, the individual that does not moult the wings and tail feathers have been found in previous research. For the identification of juvenile and young (one year after fledging) individuals, we need to consider not only iris color but also appearance and behaviour of an individual and reproductive behaviour of adults.

CHANGES IN FOREST MANAGEMENT AND LIFE-STYLE CAUSED ENDANGERMENT OF GOLDEN EAGLES IN JAPAN

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260 pairs of Golden Eagles (*Aquila chrysaetos*) are estimated to live in Japan, a country of which 67 % (2,521,000 ha) is covered by forests. According to the nationwide survey by the Society for Research of Golden Eagle in Japan,

43 pairs disappeared from 1981 to 2005 (19 pairs from 1981 to 2000 and 24 pairs from 2001 to 2005). In addition, the breeding success declined dramatically from 47.1% in 1981-1985 to the low level of 27.4% in 2001-2005. Main prey are Cooper pheasant *Syrmaticus soemmerringi*i, Japanese Hare (*Lepus brachyurus*), and large snakes such as Japanese Ratsnake (*Elaphe climacophora*). Eagles forage for this prey not only in limited and scattered natural open areas including post-avalanche grass lands, low shrubs in high mountain ranges or karst landscapes, but also artificial open areas including logging areas after producing lumber or charcoal, grass areas burnt to maintain grain fields or fields of Japanese Silver Grass (*Miscanthus sinensis*) used for thatched roofs, etc. Moreover, deciduous broad-leafed forests are essential foraging areas when leaves drop off where prey can be detected from above forests by Eagles. However, artificial plantations of conifer evergreen trees such as Japanese Cedar (*Cryptomeria japonica*) have been heavily promoted since 1950 and more than 300,000 ha (1.2% of forest) was planted every year until 1971. As the result, 41% of forests were covered by artificial conifer evergreen trees in 2007. Additionally, people stopped using charcoal or firewood for fuel since the 1950s. In the 1980s most artificial forest was occupied by grown artificial conifer evergreen trees (more than 15 years old) and such completely covered landscape still remains due to the decline in price of timber. The population of the Golden Eagle has decreased drastically and faced endangerment due to low breeding rates, along with the rapid disappearance of artificial open areas. The wise use of forest resources is necessary for maintaining not only sustainable life for humans but also the diversity of raptors in Japan.

GRAY-FACED BUZZARD *(Butastur indicus)* NESTLING DIET IN NORTHERN JAPAN: AN ANALYSIS USING VIDEO RECORDING SYSTEMS

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Nesting behavior of two pairs of Grey-faced Buzzards (*Butastur indicus*) was observed during the 2008, 2009 breeding seasons in Iwate Pref., Japan, the northern limit where this species can breed. In Japan, Grey-faced Buzzards prefer to breed in *satoyama* including *yatsuda* where paddy field is adjacent to woods. Before their breeding seasons began, we installed a small camera in the nesting tree to collect diet information of this species in 2007. The inside of the nest was videotaped for 15 hours a day between 4:00 and 19:00 for 133 days from early April to the end of June, during two breeding seasons. By freeze-framing video footage, we identified the time parent birds moved in and out of the nest, the weather, individual prey item species delivered to the nest, and measured the length of prey fed to the young, etc. We captured the same species as the ones fed to the young such as frogs, snakes, lizards, small mammals, etc., and measured their length and weight respectively to calculate the allometric formula. Then we

applied the measured length of prey items to the formula to estimate the weight of each prey item. This study indicated that the Grey-faced Buzzard had various feeding habits such as frogs (Ranidae, Rhacophoridae, Hylidae, Bufonidae), snakes (Colubridae, Viperidae), lizards (Lacertidae), small mammals (Talpidae, Muridae), and insects (Cordulegasteridae, Aeshnidae, Saturniidae, Tettigoniidae, Cicadidae, etc.). In these prey species, tokyo daruma pond frogs, green tree frogs, snakes, Japanese grass lizards and small mammals appeared to be important prey items fed to the young during the nestling period in terms of both frequency and weight. The rate and the frequency each prey item species was delivered to the nest varied according to season and time, depending on the prey item species. It was also found that depending on the weather, different prey species were delivered to the nest. The percentage of reptiles increased in fair weather and decreased in rainy weather. On the other hand, the percentage of frogs increased in rainy weather. Qualitative review of the data suggested that parent birds varied their prey species according to season, time and weather during nestling periods. Gray-faced Buzzards may be able to escape failing in breeding even when the number of prey in the breeding region is affected by the annual fluctuations in temperature, because their prey use is diverse and prey are abundant and available in our study area throughout the breeding season. This evidence suggests that *satoyama* can be a desirable breeding habitat for Gray-faced Buzzards due to its high biodiversity. This work was supported by Grant-in-Aid for Scientific Research (C) (19510231).

SCREENING ON SUSPECTED SECONDARY RODENTICIDE POISONING BY DETERMINATION OF COAGULATION TIMES IN BARN OWLS (*Tyto alba*) IN TANJUNG KARANG, SELANGOR, MALAYSIA

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A screening study on the suspected secondary rodenticide poisoning in barn owl (*Tyto alba*) was carried out by determination of coagulation times. A total of 43 blood samples of barn owls were collected from various rice fields at Tanjung Karang, Selangor. A few farmers in that area were interviewed to survey on the type of rodenticides being used to control the rat population in their rice fields. The rodenticides include Warfarin, Bradifacoum and Zinc Phosphide. Plasma from each sample was extracted out to determine the Prothrombine Time (PT) and the Activated Partial Thromboplastin Time (APTT). Hemogram was done at the same time on the Packed Cell Volume (PCV) and the thrombocytes count. Plasma biochemistry on Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Creatinine and Total Protein (TP) was determined as

well in this study. The mean of PCV and corrected thrombocytes count were slightly lowered than the mean reference value. The mean TP was higher than the mean reference value. Low in PCV and the high TP indicate that the barn owls may have slight anemia with dehydration. Beside that, the mean ALT was one time higher than the mean reference value. Elevation of ALT can be due to toxic hepatitis, cirrhotic and neoplastic liver disease as well as other liver diseases. In this study, there were o elevations in both AST and creatinine. Therefore, from the results that obtained for both AST and creatinine in this study, there was no indication of muscle damage in the barn owls. The PT values were prolonged in 90.7% of the total blood samples that were tested. On the other hand, the APTT of 79.1% of the total blood samples tested were prolonged as well. Hence, the results showed that there were coagulation abnormalities in the coagulation cascade of the barn owls. Determinations of PT and APTT in suspected anticoagulant rodenticide poisonings play a vital role in the evaluation of the abnormalities in the coagulation cascade. Extensive usage of anticoagulant rodenticide by the rice field farmers in Tanjung Karang area could be a potential hazard to the barn owls and may eventually lead to decrease in population of barn owls in that area.

DEVELOPMENT AND SEXUAL DIMORPHISM IN SAKER FALCON (*Falco cherrug*) NESTLINGS IN CENTRAL MONGOLIA

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We studied development and sexual dimorphism in nestling Saker Falcons in 2008 in central Mongolia. We weighed and measured wing chord and tarsus circumference of 83 nestlings from 26 nests at approximately 10-day intervals. The maximum weight of the nestlings was reached at the age of 30-36 days; the maximum length of wing chord was reached at the age of 27-33 days, whereas the maximum tarsus circumference was reached at the age of 30-40 days. Weight and tarsus circumference of male and female nestlings were similar until ca. 24 days old, after which females could be distinguished from males by both weight and tarsus circumference (females were larger than males). The body weight difference of males and females averaged 228 g and tarsus circumference 3.56 mm at fledging. Body weight recession was observed before fledging. There was no significant difference in 1st primary between male and female nestlings.

CURRENT HABITAT CONDITION OF RAPTORS IN MONGOLIA

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Mongolia is a large country, consisting of different natural habitats and zones which are characterized by extreme climate condition, and boreal ecosystem's flora and fauna in Central Asia. Of 472 species of birds, 44 species are diurnal and 12 species are nocturnal. Prof. O. Shagdarsuren was one of the pioneering ornithologists who collected and summarized baseline research on raptors in Mongolia. He wrote his thesis on Raptors in Central and Southern Mongolia and their practical significance in 1964. For the last several years, A.Bold, Sh.Boldbaatar, S. Gombobaatar, B.Nyambayar have separately published papers on the Steppe eagle, Golden eagle, rare raptors and prey species of these raptors in certain regions of the country. Diurnal raptors of Mongolia can be divided into the following groups based on habitats and biotopes; Steppe raptors (*Buteo lagopus, B. hemilasius, B. rufinus, Hieraaetus fasciatus, Aquila nipalensis, F. cherrug, F. pelegrinoides, F. peregrinus, F. naumanni, F. tinnunculus),* High mountain raptors (*Aquila chysaetus, Gypaetus barbatus, Neophron percnopterus, Aegypius monachus, Gyps fulvus, G. himalayensis, Falco rusticolus*, Forest raptors (*Pernus apivorus, P. prilorhynchus, Milvus migrans, Accipiter gentilis, A. nisus, A. badius, A. gularis, Buteo buteo, Circaetus gallicus, Spizaetus nipalensis, Hieraaetus pennatus, Aquila clanga, A. heliaca, Falco subbuteo, F. columbarius, F. vespertinus, F. amurensis*) and Wetland raptors (*Pandion haliaetus, Cyrcus cyaneus, C. macriurus, C. pygargus, C. melanoleucus , C. aeruginosus, Haliaeetus leucoryphus, H. albicilla)*. Some of them are fairly common species in Mongolia. Some of them are scavengers (Egyptian Vulture *Neophron percnopterus*), Bearded Vulture, (*Gypaetus barbatus*), Griffon Vulture, (*Gyps fulvus*), Himalayan Vulture (*Gyps himalayensis*) and Cinereous Vulture (*Aegypius monachus*). The Black Kite is the only species that lives in urban areas. Osprey (*Pandion haliaetus*), White-tailed Eagle (*Haliaeetus albicilla*) and Himalayan Vulture are listed in the Red Data Book of Mongolia published in 1997. Habitat loss is a potential threat to these raptors in Mongolia and it has been raising concern amongst ornithologists and conservationists in the country.

CURRENT STATUS OF RAPTORS IN THE TAIGA FOREST, NORTHERN MONGOLIA

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The Khonin Nuga research station is situated in the forest of the Siberian mountain taiga and part of the West Khentey, Mongolia. The research station was established in 1997. Since then ornithologists from Mongolia, Germany, Taiwan and Russia have been conducting field surveys on raptors and other wildlife in this area. All in all no less than 23 raptor species have been proven to occur in this area. Out of those 23 species seven (30%) are resident, while eleven (48%) are summer visitors and breeding, whereas five (22%) are vagrants. Osprey (*Pandion haliaetus*), Hobby (*Falco subbuteo*), Lesser Kestrel and White-tailed Eagle (*Haliaeetus albicilla*) are found to breed in the forest. Cinereous vulture (*Aegypius monachus*), Steppe Eagle (*Aquila nipalensis*), Lesser Kestrel (*Falco naumanni*), Amur Falcon (*Falco amurensis*) and Saker Falcon (*Falco cherrug*) are rare and summering species. Apart from that, Griffon Vulture (*Gyps fulvus*), Northern Harrier (*Circus cyaneus*), Grey-faced Buzzard (*Butastur indicus*), Long-legged Buzzard (*Buteo rufinus*) and Short-toed Snake-eagle (*Circaetus gallicus*) were recorded only once or twice in Khonin Nuga and are thus considered to be vagrant in this area. White-tailed Eagle and Peregrine Falcon (*Falco peregrinus*) are listed in Appendix I of CITES and 20 additional species are included in Appendix II of CITES. Furthermore Greater Spotted Eagle (*Aquila clanga*), White-tailed Eagle and Lesser Kestrel are listed in Appendix I of CMS apart from 22 species that are listed in Appendix II of CMS. Information and scientific data on Cinereous vulture, Greater Spotted Eagle, White-tailed Eagle and Lesser Kestrel were taken into account by Birdlife International when the Red Data Book of Asia was produced in 2001. According to the IUCN category and criteria, plenty of raptors are threatened worldwide, including some that are found in the Khonin Nuga valley. Amongst those for example are the Saker Falcon, assessed as Endangered (EN), the Greater Spotted Eagle as well as the Lesser Kestrel which were found to be Vulnerable (VU), and the Cinereous vulture that has been categorized as Near Threatened (NT). Breeding documentation on globally and regionally threatened raptor species (Osprey, Hobby, Lesser Kestrel and White-tailed Eagle) as well as further observations imply that Khonin Nuga is significant not only for passage migrants but also for threatened breeding raptors.

BIOLOGY, ECOLOGY AND CONSERVATION OF SAKER FALCONS (*Falco cherrug*) IN MONGOLIA

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Field surveys focused on taxonomy, distribution, breeding ecology, and population threats of Saker falcons in different natural zones including forest steppe, mountain steppe, steppe, desert steppe and high mountains in Mongolia from 1998 to 2007. Based on biological, phylogenic and morphological concepts, the Saker Falcon *Falco cherrug* is a polymorph species consisting of individuals differed by plumage color, body size and behavior. Mongolia is one of the reserve countries of breeding Saker Falcons in the World. Our population estimation showed that approximately 40% of the World's population breeds in the country. Dominant preys of the species were small and medium-sized birds (Pallas' Sandgrouse, Skylark, Asian Short-toed Lark, Mongolian Lark, Horned Lark, Siberian Rubythroat, Isabelline Wheatear, Eye-browed Thrush, Dusky Thrush, Brown Srike, Small Snow Finch) and rodents (Brandt's Vole, Mongolian Gerbil, Midday Gerbil, Daurian Pika). Insects and reptiles reached 1.29%, birds 33% and mammals 65.7% of total individuals in the diet. These animals are widely distributed across the country and densely populated in all habitats. The number of individuals of birds and Brandt's Vole in the diet varied across years depending on Brandt's Vole density. According to our field observations, female Sakers spend most of their time (90% of a total daily activity) near the nest, defending the breeding site, clutch and chicks. Daily activities of males for hunting reached 75.6% of their time. For selection of their nest site, males were more active than females. Females played a significant role in defending the nest site, laying eggs and feeding chicks after the nest site was selected by males. Breeding pairs nested on 21 types of deserted and newly built nests by Upland Buzzards, Northern Ravens, Steppe Eagles, Golden Eagles, Black Vultures, Black Storks, Black Kites, and Carrion Crows. From the total recorded nest substrates, 43.2% were on natural and 56.8% were on artificial or man-made materials. The number of breeding pairs and breeding successes was highly dependent on the number of Brandt's Vole, air temperature, and snow cover in spring and winter. During the field surveys, hatching success was 88.1%, fledging success (83.8%) and breeding success (73.8%) on average in high vole density areas. Radio tracking results showed that home range size varied by sexes: for males from 214.7 to 290.5 sq. km, for females from 78.2 to 188.8 sq. km. The size of the home range for breeding males was larger than females. According to satellite tracking studies, adult birds wintered in Mongolia depending on snow cover, wintering vole colonies, and suitable hunting areas. During the wintering period, the three tracked birds moved 201-330 km on average between breeding and suitable wintering sites. Breeding females and first year birds migrated to the

south of the country and passed through Dundgobi, and Umnugobi provinces and wintered in Yangtze river, China. The total coverage of their travels was 4866.5 km. By the beginning of March, they left the wintering ground and arrived at the same breeding site by the middle of March of the same year. In order to conserve Saker Falcons in Mongolia, we would consider threatening factors including abundance of prey species, predators and human impacts. A conservation action plan for the species should consist of 5 different actions such as International and National Level Legislation, Species Conservation Activities, Long Term Research, Science-based Sustainable Use (Artificial nest platform programme on poles of the high power electric lines), and Public Awareness.

THE LARKS- A VICTIM OF BIRDS OF PREY

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Small birds represent the majority of food for birds of prey in the country. Among them larks, which occur in great numbers, played a significant role. The phenomenon that larks fly into the Mongolian "Ger", chased by raptors, is common in Mongolia. However, this is one of the indications of the relation between prey species and birds of prey. Our field study experiences show that the phenomenon has been occurring many times. However, there is no case study on this issue. In recent years, our researchers have been interested in studying *regurgitations*. The Saker Falcon, Lesser Kestrel, Common Kestrel, Northern Harrier, Upland Buzzard, Steppe eagle, Merlin and Eurasian Hobby often attack Lark species including Mongolian Lark, Horned Lark and Eurasian Skylark which are widely distributed in the steppe and the Gobi region. Therefore, these species are a major part of the diet of birds of prey. Birds of prey are on the top of the ecological food chain that explains the exchanges of energy and food in ecosystems. This indication demonstrates that their population number used to be less than for other animals.

ARTIFICIAL NEST EXPERIMENT FOR RAPTORS ON THE STEPPE IN EASTERN MONGOLIA

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Collaborative field research works of the Ecology Center, Mongolian State University of Education and Japan Ecology Foundation on artificial nest platforms for raptors were conducted in Galshar soum, Khentii aimag. The main purpose of the research was to determine the effectiveness of artificial nests for

steppe raptors, and the relationship between raptors and rodents. Our study area is located in the area where rodenticide has not been used for many years. A total of 55 artificial nest platforms were built on a single pole with the height of three meters in an area where Brandt's Vole (*Lasiopodomys brandti*) are randomly distributed (Batsaikhan, 2002). Twenty artificial nests were placed on the ground. The distance between each nest was approximately 3 kilometers. Every third of the established artificial nests were occupied by Raven (*Corvus corax)*, Upland Buzzard (*Buteo hemilasius),* Saker Falcon *(Falco cherrug)* and Steppe Eagles (*Aquila nipalensis).* In order to know diet of the breeding species, the pellets under the artificial nests were collected during the field surveys and analyzed in the Laboratory of Ecology Center of the Mongolian State University of Education. The pellets collected near Upland Buzzard nests contained skulls, mandible, hair and nails of Brandt's Vole. However, marmot bones in pellets were found in the nests of Steppe Eagles. In October, we observed a Saker Falcon eating an individual of Campbell's Hamster (*Phodopus campbelli).* We have not found this prey species in the diet of Saker falcons since 2003. Our research results show that Upland Buzzard, Saker Falcon, and Steppe Eagle play a significant role in reducing the number of rodents including Brandt's Vole on the steppe. We found that Least Weasel (*Mustella nivalis*), Brown Shrike (*Lanius cristatus*) and others play an important role in balancing the number of Brandt's Vole within the study area. Comparing with home range studies of Saker Falcons, we conclude that reducing the quota for the export of Saker Falcons from Mongolia to Middle Eastern countries will be essential to protect pastureland from pest rodents. This means that chemical controls should be replaced by biological control such as support of breeding success of the steppe raptors using artificial nests on the steppe.

NESTING AND SATELLITE TRACKING OF SAKER FALCONS *(Falco cherrug)* IN SOUTHERN GOBI IN MONGOLIA

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We studied the nesting, area use, and migration of Saker Falcons nesting in the Galba Gobi Important Bird Area in the southern part of Mongolia. We found 11 pairs of Saker Falcon nesting in the study area in 2009. The nesting density was 0.13 pair per 100 km square area. Such nesting density is an indication of

the importance of this area for the species. Our work was mainly concentrated in open semi-desert and desert areas and we have no doubt that there could be more nests in nearby rugged hilly and mountainous areas. All nests we found were in mature elm trees located in a dry river bed or on the edge of a small wooded area. Saker Falcons were highly dependent on old mature trees and saxauls to nest in the open landscape of the Gobi. The adult female was tracked until the start of the next breeding season in 2010, the adult male was tracked from June to October 2009, and a young female was tracked until December 2009. Satellite tracking data shows that the foraging range of a female falcon was larger than males during the nesting season. The young female falcon migrated to the southwest and wintered in the Qinghai–Tibetan Plateau. Adults were highly mobile or nomadic during post-breeding and wintering periods. The general movement patterns of adults were markedly different. They were making short-distance movements within Mongolia and to some areas in northern China and both were coming back to their nesting area, at least once a month, after spending some time away from the nesting area. This individual variation is likely to be related to age and sex differences between birds, and conditions of the different environments where they traveled such as food supply and weather conditions. Another reason for the adults' repeated visits to the nesting area during non-breeding season is to maintain nesting territory where suitable nesting site is limited in open desert steppe region. There are very few man-made structures suitable for falcons to use in Galba Gobi.

STATUS AND CONSERVATION OF RAPTORS IN HUSTAI NATIONAL PARK, MONGOLIA

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The Hustai National Park is located at the junction of several soums (Argalant, Altanbulag and Bayankhangai soums of Tuv province). The Hustai nuruu National Park is unique because of various types of natural zones and habitats that play an important role for breeding and migrating raptors. As a result of our field research works during the past years, there are more than 400 species of insects, 16 species of fishes, 2 species of amphibians, 3 species of reptiles, 46 species of mammals and 218 species of birds. From 1992 to 2010, 28 species belonging to 13 genera, 3 families of raptors were known in the park. The total number of species in the park expresses 63.6% of all recorded raptor species in Mongolia. Black Kite (*Milvus migrans*), Eurasian Hobby (*Falco subbuteo*), Amur falcon (*Falco amurensis*), Lesser Kestrel (*Falco naumanni*) and Common Kestrel (*Falco tinninculus*) are breeding in the area. Osprey (*Pandion haliaetus*), Oriental Honey-

buzzard (*Pernis ptilorhyncus*), Northern Harrier (*Circus cyaneus*), Western Marsh Harrier (*Circus aeruginosus*), Northern Goshawk (*Accipiter gentilis*), Eurasian Sparrowhawk (*Accipiter nisus*) Rough-legged Buzzard (*Buteo lagopus*), Long-legged Buzzard (*Buteo rufinus*), Common Buzzard (*Buteo buteo*), Booted Eagle (*Hieraaetus pennatus*), Imperial Eagle (*Aquila heliaca*), Pallas's Fish Eagle (*Haliaeetus leucoryphus*), White-tailed Eagle (*Haliaeetus albicilla*), Himalayan Vulture (*Gyps himalayensis*), Peregrine Falcon (*Falco peregrinus*), Merlin (*Falco columbarius*) and Red-footed Falcon (*Falco vespertinus*) are passage migrants. Resident species including Upland Buzzard (*Buteo hemilasius*), Steppe Eagle (*Aquila nipalensis*), Golden Eagle (*Aquila chrysaetos*), Lammergeier (*Gypaetus barbatus*), Cinereous Vulture (*Aegypius monachus*) and Saker Falcon (*Falco cherrug*) are present all year round in the park. Four species of raptors - Imperial Eagle, Pallas's Fish Eagle, White-tailed Eagle and Peregrine Falcon are listed in Appendix I of CITES, 22 species in Appendix II and two species are entered in the Red Data Book of Mongolia (1997). These facts show that Hustai Nuruu national park is one of the most significant breeding and migrating areas for rare and endangered raptors in the country.

A DIETARY STUDY OF SAKER FALCONS (*Falco cherrug*) IN CENTRAL MONGOLIA

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Between 1998-2004, 1032 nest sites of Saker Falcons were visited in Central Mongolia during different seasons in order to collect pellets and diet remains. The pellets and diet remains were analyzed at the Ornithological Laboratory of NUM and identified 2563 prey individuals from 10818 prey remains. The analysis identified 29 individual insects belonging to 8 families and 4 individuals belonging to two species of reptiles; Mongolian Racerunner *Eremias argus* and Toad-headed Agama *Phrynocephalus versicolor.* The results suggest that reptiles and insects are easy prey for new fledglings and young Sakers at the end of the breeding season. No amphibians were detected in the Saker diet. A total of 851 individuals from 60 species of birds were identified from the pellet and diet remains. The most common avian prey species were Horned Lark *Eremophila alpestris* (102 individuals, 4%), Lesser Short-toed Lark *Calandrella rufescens* (59, 2.3%), Mongolian Lark *Melanocorypha mongolica* (55, 2.1%), and Eye-browed Thrush *Turdus obscurus* (54, 2.1%). During seasonal migration, passerines form a major part of the diet of breeding Sakers. Analysis indicated that a significant

proportion of the diet of the Sakers in Central Mongolia consisted of mammal species. We identified a total of 16 mammal species in the prey remains such as Brandt's Vole *Lasiopodomys brandti* (1303 individuals, 51%), Mongolian Gerbil *Meriones unguiculatus* (100, 3.9%), Mid-day Gerbil *Meriones meridianus* (63, 2.5%) and Daurian Pika *Ochotona daurica* (31, 1.2%). A total of 87.5% of the dietary findings from Sakers in Central Mongolia consists of species which are common and widely distributed through the Mongolian steppe. According to our study, Sakers prefer to select mammals and birds within the size range 10.1-350mm long and weighing 10.1-400.0g. The study found that the composition of mammal and birds in the diet of Sakers differed during breeding and fall-wintering seasons with an increase in the avian prey during the fall-winter period, corresponding with a decrease in daily activity of Brandt's Vole. Due to the wide diversity of species existing on the Mongolia steppe, the study found that species diversity in the diet of Saker Falcons in Mongolia is richer than in populations found in western countries.

OVERVIEW OF RAPTOR MIGRATION IN SINGAPORE FROM THREE YEARS OF OBSERVATIONS (2007-2010)

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Located at the tip of the Malaya Peninsula, Singapore does not fall on the main migratory route of raptors flying between the Peninsular and Sumatra, Indonesia. As such, large numbers of migrating Chinese Sparrowhawks (*Accipiter soloensis*), Oriental Honey-buzzards (*Pernis ptilorhyncus*) and Black Bazas (*Aviceda leuphotes*) that are observed over Central and West coast of Malaysia are not seen in Singapore. In our study, we collected data on all raptors observed migrating or wintering in Singapore over a period of three years. Our study aims to show the diversity and abundance of raptors that regularly migrate and winter in Singapore. We compiled three years of records from field observations for a six month period from October to March for 2007/2008, 2008/2009 and 2009/2010 and two full day Raptor Watches (9th Nov 2008 and 8th Nov 2009) to form a baseline database of migratory raptors in Singapore. Our three years of data also filled many gaps on the status and patterns of spring and autumn migration between the Malay Peninsula and Indonesia. Our findings consistently confirmed that peak raptor passage occurs in November. Of the 25 migrant raptor species listed in the Singapore checklist, we recorded a total of 18 species. We also confirmed that the migration path taken by the raptors is not confined to western Singapore, but also in the eastern and southern parts of the island. The Oriental Honey-buzzard (*Pernis ptilorhyncus*) is the most abundant migratory raptor, followed by the Black Baza (*Aviceda leuphotes*) and the Japanese Sparrowhawk (*Accipiter gularis*). Surprisingly, of the thousands of Chinese Sparrowhawks (*Accipiter soloensis*) observed to migrate through Malaysia, few reach Singapore and we have less than 20 records of this species annually. Due

to better observation field coverage, we now have more records of otherwise rare species, and these may in fact be more common than previously thought. They include the Rufous-bellied Eagle (*Hieraaetus kienerii*), Jerdon's Baza (*Aviceda jerdoni*), Common Buzzard (*Buteo buteo*), Pied Harrier (*Circus melanoleucos*), Booted Eagle (*Hieraaetus pennatus*) and Common Kestrel (*Falco tinnunculus*). Other rare migratory raptors documented include a Greater Spotted Eagle (*Aquila clanga*) in Nov 2007 and two birds together in October 2009; three Himalayan Vultures (*Gyps himalayensis*) in January 2008 and one bird in January 2010; and a Short-toed Eagle (*Circaetus gallicus*) on November 2009. A new addition to the national list was an Amur Falcon (*Falco amurensis*) sighted at reclaimed land in eastern Singapore on Nov 2007. We also recorded large flocks of Black Bazas numbering in the 50s and 60s. An unusual record is high counts of 359 Oriental Honey Buzzards recorded in one afternoon during the spring migration in March 2009. This is the first record in spring of large numbers of Honey Buzzards sighted on passage on northbound migration.

STATUS AND CONSERVATION OF MIGRATORY AND RESIDENT RAPTORS IN SINGAPORE (2007 – 2009)

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Limited systematic information is available for most species of raptors in Singapore despite extensive observations of many species. While the number of migratory raptors wintering in Singapore is probably relatively low, historical and recent observations have shown the island to be a significant transit point for raptors on autumn and spring passage between the Malay Peninsula, Sumatra and the Riau islands. Movements of fairly large numbers of three raptors, namely the Oriental Honey-buzzard *Pernis ptilorhynchus*, Japanese Sparrowhawk *Accipiter gularis* and Black Baza *Aviceda leuphotes* have been reported annually, with exceptional concentrations from a number of sites (e.g. Tuas, Kent Ridge). We report here the status of these three key migratory raptors based on three years of field census data from a number of localities throughout Singapore. We also evaluated the conservation status and population of four key, large resident raptors in Singapore, namely the Grey-headed Fish-eagle *Ichthyophaga ichthyaetus*, White-bellied Sea-eagle *Haliaeetus leucogaster*, Crested Serpent Eagle *Spilornis cheela*, and the Changeable Hawk-eagle *Spizaetus cirrhatus*. Our findings suggest that the Oriental Honey Buzzard is the most abundant and widespread migratory raptor in Singapore, with a maximum of over 1500 individuals recorded on passage in November 2009, with smaller numbers recorded for both Japanese Sparrowhawk and Black Baza. A further 15 species of raptors are also known in passage or over-wintering in Singapore though available data on their numbers and movement is scanty. Our observations however show that some locally

poorly-known migrant species like Booted Eagle *Hieraaetus pennatus*, Jerdon's Baza *Aviceda jerdoni* and Himalayan Vulture *Gyps himalayensis* may occur more regularly than previously thought. Localities supporting the highest abundances of raptors in passage appear to be concentrated along Singapore's southern, south-western, north-western and eastern coasts. These important sites include Tuas, Telok Blangah, Kent ridge, Serangoon Island and Changi. Of the four large resident raptors assessed, three are listed as nationally-threatened and are sparsely distributed across Singapore, with a notable concentration in the Central Catchment Nature Reserve. Current information shows that the Changeable Hawk-eagle and White-bellied Sea-eagle are still fairly common, with estimated national populations of about 10 and 20 pairs respectively. The Grey-headed Fish-eagle and Crested Serpent Eagle populations in Singapore total a minimum of five and one pair respectively and deserve urgent conservation attention although the former has shown some adaptability to suburban environments. We conclude that despite its small land area, Singapore remains a key locality for resident and migrant raptors in the Malay Peninsula, particularly for migrating raptors in passage to the Indonesian islands during October-November. Forest-dependant, resident raptors are highly threatened, with one species virtually extirpated, although the advent of large water bodies is in favor of piscivorous species (e.g. *I. ichthyaetus*). With its small area, accessibility and notable densities of certain raptors, the island is an excellent locality for future research on conservation and migration of raptors.

OBSERVATION AND DISTRIBUTION STATUS OF WING-TAGGED CINEREOUS VULTURES (*Aegypius monachus*) IN KOREA

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This study was conducted between December 20, 2002 and February 14, 2009 by examining and analyzing the current status of wing-tagged Cinereous Vultures (*Aegypius monachus*), inspected on 12 different occasions in 17 major wintering areas (Central region: Cheolwon, Jangdan peninsula, Goseong, etc.; Southern region: Goseong, Sancheong, Jeju, etc.). The total number of wing-tagged vultures observed was 51 individuals, 123 times. When it comes to the number of observations, they peaked in 2008 with 36 cases while they hit the bottom in 2002 with 6 cases. Classified by region, the number of observations

was 49 in Cheolwon, Gangwon Province (39.8%), followed by 37 in Paju, Gyeonggi Province mostly near DMZ area. The Cinereous Vultures that returned to the same place for three years or longer include: vulture 8 (5.1%) with a wing-tag of black background and white number; vulture 28 (5.1%) with wing-tag of black background and white number; vulture 9 (3.8%) with wing-tag of black background and white number; vulture 12 (3.8%) with wing-tag of red background and white number; vulture 17 (3.8%) with wing-tag of black background and white number; vulture 27 (3.8%) with wing-tag of black background and white number; vulture 75 (3.8%) with wing-tag of yellow background and white number, most of which have been observed in the vicinity of DMZ area (Cheolwon, Paju, Yanggu, Jeokseong and etc.). It has turned out that the Cinereous Vultures with wing-tags return to the similar area every year. In addition, the Cinereous Vultures that come to Korea for wintering are most likely to return and stay in similar districts without a long-distance relocation between central regions and the southern region once they settle in a specific area except in the initial and terminal stage of wintering, which is typically a migration period. This phenomenon is seemingly attributed to the motivation of saving energy due to difficulty in acquiring food during the winter season. There has been no international standard or guideline established with respect to the colors and shapes of wing-tags for Cinereous Vultures by nation and each nation conducts examinations for Cinereous Vultures in a closed manner, which makes it extremely difficult to obtain and share relevant information for mutual benefits. Therefore, forming an international network for monitoring of Cinereous Vultures and international standards for manufacturing of wing-tags will facilitate sharing relevant information, which will in turn greatly contribute to precisely identifying the passage and direction of migration for Cinereous Vultures.

HIGH PROPORTION OF OILED *ANCIENT* MURRELETS IN WINTER DIETS OF PEREGRINE FALCONS IN HONGDO, KOREA

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The diets of Peregrine Falcons (*Falco peregrinus*) have been well documented around the world for a long time, but there is little information on its winter diet on the Korean coasts. To document winter diets of Korean Peregrine Falcons, we visited three main perches of one sedentary pair of Peregrine Falcons every week and searched for prey remains from December 2009 to February 2010 on Hongdo Island (N 34° 41', E 125° 11'), Jeonnam Province, Korea. Collected prey remains were identified to the species level in a laboratory based on their morphological features. As a result, a

total of 22 prey remains from six avian species were collected: 14 Ancient Murrelets (*Synthliboramphus antiquus*), three Oriental Turtle Doves (*Streptopelia orientalis*), two Black-tailed Gulls (*Larus crassirostris*), one East Siberian Gull (*Larus vega*), one Pale Thrush (*Turdus pallidus*), and one Feral Pigeon (*Columba livia*). Because of the limited number of prey on the small stopover island during winter, the Peregrine Falcons preyed mainly on wintering seabirds (77.3% of total prey in frequency) and supplemented their diet with some other taxa. Particularly, the Ancient Murrelet was the most important winter prey for the pair on Hongdo. However, 13 of 14 murrelets collected (92.9%) were contaminated by oil spills. This observation indicates that the oiled Ancient Murrelets are easy targets for Peregrine Falcons to prey on, and that oil spill incidents may increase predation rates of seabirds by raptor species. This study also suggests that the Peregrine Falcon can be affected by oil spill incidents to some extent; however, at this point, it is difficult to identify whether the high proportion of oiled Ancient Murrelets in winter diets is beneficial for the Peregrines as increased available prey or harmful due to increased exposure to toxic contaminants.

FEEDING CHARACTERISTICS OF CINEREOUS VULTURES (*Aegypius monachus*) IN JANGDAN PENINSULA, KOREA

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The primary purpose of this study is to understand the feeding characteristics of Cinereous Vultures (*Aegypius monachus*) in the Jangdan Peninsula, Paju-si, Gyeonggi Province - the largest wintering area for these vultures in Korea - based on the number of Cinereous Vultures present, feeding status, and onsite inspection. A total of 14 inspections occurred between February 2003 and February 2010. The average number of Cinereous Vultures found on the Jangdan Peninsula is estimated to be 331.14 (SD=312.92, Range=15~1,100, n=14). The vultures in Jangdan Peninsula account for 32% of the total number of Cinereous Vultures in Korea, which is estimated to be 1,052. Together with the number of Cinereous Vultures in Cheolwon-gun, Gangwon province (29.9%), located about 60km away from Jangdan Peninsula, they account for 62% of the average number of Cinereous Vultures wintering in Korea. Artificial feeding for the Cinereous Vulture was started in 1998 in Jangdan Peninsula by the Paju-si Association For Bird Protection. Chickens that died due to heavy

snowfall and cold spells were used as the major food source in the initial stage. The surge in vulture numbers, however, has caused a number of subsequent Cinereous Vulture related incidents such as dehydration and intrusion into local farmhouse. The government (Cultural Properties Administration) that reached the consensus on the necessity of feeding had secured a budget for feeding in 2004. However, the budget was not sufficient to cover feeding on a regular basis (once a week approx. 1,500~2,000). Therefore, Paju-si Association For Bird Protection collected dead poultry and livestock stockbreeders to offer them to Cinereous Vultures. It is common to see dead domestic animals due to a drastic drop in temperatures during the winter time as well as a lack of proper breeding facilities in Paju. The owners of these dead animals offer them as feed for Cinereous Vultures with concern about additional costs in handling dead animals. In particular, veterinary examinations of dead animals contribute to safe feeding for Cinereous Vultures. The successful Cinereous Vultures feeding in Jangdan Peninsula of Korea is attributed to a number of factors, including sincere efforts of voluntary institution in charge of Cinereous Vultures feeding, government budget allocated for feeding, examination and provision of dead animals that are combined to create a virtuous circle.

SPRING MIGRATION OF CHINESE GOSHAWK *(Accipiter soloensis)* AT HEUKSAN ISLAND, KOREA

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The Chinese Goshawk is one of the common breeding Accipitridae raptors in Korea, yet there is little information about its migration routes and timing in Korea. Migrating Chinese Goshawks were observed at Heuksan Island, Korea during spring 2003-2004. I counted 3,031 Chinese Goshawks in May 2003, and 3,053 in May 2004. The first Chinese Goshawk was observed in late April, and their migration peak was recorded in middle and late May. Most of the individuals were seen heading north. Seventy four percent of Goshawks were counted with NNW and N winds, and 25% of Goshawks were counted with SE and S winds. But, there were no migrations observed with E and W winds. This study shows that islands in the southwestern part of Korea are very important areas for migrating Chinese Goshawks in spring. But, there was no significant migration observed in fall. For the clear view of Chinese Goshawk migration of Korea, hawk migration monitoring is needed along the west coast of Korea in spring. Both the origin and destination of Chinese Goshawks passing along the islands of the west coast remain unknown, and studies of Chinese Goshawks with satellite transmitters will improve our knowledge of migration patterns of different populations.

ANESTHETIC CONCENTRATION AND CHARACTERISTICS OF INDUCTION AND RECOVERY

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The aim of the study was to determine the minimum anesthetic concentration (MAC) of isoflurane and sevoflurane and characteristics of induction and recovery in sixteen Collared Scops-Owls (*Otus lettia*). The anesthesia was induced by either 2.5 MAC isoflurane or 2.5 MAC sevoflurane and was then maintained by 1.2 MAC of these two drugs for 15 mins. Experimental parameters including heart beat rates, respiratory rates, body temperatures, $ETCO_2$, extubation times, standing times, and recover quality were measured. Our results revealed that MAC of isoflurane and sevoflurane were 1.72% ± 0.18% and 3.24% ± 0.27% (mean ± SD), respectively. Using 2.5 MAC of isoflurane (4.3 %) and sevoflurane (8.1 %) for anesthesia, the intubation time (sec) were 163.75 ± 21.86 and 148 ± 20.21, respectively. When maintaining anesthesia by 1.2 MAC for 15 mins. after intubation, there was no significant difference ($p>0.05$) in either heart beat rate or body temperature between anesthesia with isoflurane and sevoflurane. However, respiratory rate and $ETCO_2$ showed significant differences ($p<0.01$) between anesthesia with these drugs. Although recovery time (time to extubation and standing) did not differ, birds anesthetized with sevoflurane showed less ataxia than those with isoflurane. Significantly negative relation with low respiratory rate and high $ETCO_2$ concentration was noted, but these parameters all fell in normal range. Increased oral secretion was also observed in animals anesthetized with sevoflurane. We concluded that both isoflurane and sevoflurane provide safe and smooth anesthesia regarding rapid induction, maintenance and recoveries for Collared Scops-Owls. Additionally, compared with isoflurane, sevoflurane offers shorter induction and recovery time and better recovery quality. Overall, sevoflurane anesthesia had fewer adverse effects and may be superior to isoflurane for anesthesia in Collared Scops owls.

INTRODUCTION TO THE RAPTOR RESEARCH GROUP OF TAIWAN AND ITS ACTIVITIES

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Raptor Research Group of Taiwan was established in 1994. It is the first and only NGO completely devoted to raptor conservation in Taiwan. The aim of RRGT is to collect scientific data useful for conservation and management of raptors, and to promote public education on raptors. Since its establishment, RRGT has been conducting a number of on-going research programs including: A) Monitoring autumn migration of raptors at Kenting National Park, especially the Chinese Goshawk (*Accipiter soloensis*) and Grey-faced Buzzard (*Butasur indicus*). B) Banding migrating raptors to collect basic biological information on Chinese Goshawk and Grey-faced Buzzards. C) Satellite tracking the migration of Grey-faced Buzzards (see the other poster). D) Studying the ecology of Black Eagle (*Ictinaetus malayensis*), an endangered species in Taiwan. E) Censusing the Crested Serpent Eagle (*Spilornis cheela*) in Guanyingshan, Taipei County. In the public education angle, RRGT has produced a short film to promote the conservation and protection of the Grey-faced Buzzards, and a full-length film on Oriental Honey Buzzard that is in the final stages of producing. In addition, RRGT publishes the journal Raptor Research of Taiwan. RRGT participates actively in many of ARRCN's international programs, and welcomes worthwhile collaboration with other countries.

SATELLITE TRACKING THE MIGRATION OF GREY-FACED BUZZARD (*Butastur indicus*)

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Grey-faced Buzzards (*Butastur indicus*) breed in NE China and Japan. They migrate in large flocks in East Asia and pass through Taiwan in autumn and in spring. Satellite tracking in Japan found birds breeding in Japan wintered in the Ryukyus. This study hopes to reveal where Taiwan's Grey-faced buzzards winter and breed, and their migration routes. Ground counts at Kenting Taiwan showed that north-bound Grey-faced Buzzards arrive in several peaks between March and May, suggesting different wintering populations in SE Asia. We tagged 3 birds

(1M, 2F) in Kenting in October 2008 and found that they wintered on different islands in the Philippines. In spring, all three birds headed north, following 2 different routes. We tagged two more males in March 2009 at Changhua, Taiwan, during their spring migration. Altogether, two birds (1M,1F) died on their way north. The other three (2M, 1F) settled in northern Korean Peninsula and southern Manchuria, presumably to breed. They passed through Taiwan in mid October 2009 then went to the Philippines to winter. With increased sample size we hope to learn whether Grey-faced Buzzards breeding in North Korea follow the same migration routes in autumn and in spring, and whether the different routes taken reflect individual, sexual, or populational traits.

SPRING RAPTOR MIGRATION SURVEY IN HENCHUN PENINSULA, SOUTHERN TAIWAN

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Taiwan is an important midway point for migrating birds traveling between breeding grounds in East Asia and wintering grounds in Southeast Asia. The autumn raptor migration over Kenting National Park at the southern tip of Taiwan has been well known and long monitored. Yet there have been very few studies on the spring migration of raptors here. RRGT started a March-to-May spring raptor count in 2008, monitoring the stretch of land between Kenting and Henchun. The target species are Gray-faced Buzzards (*Butastur indicus*) and Chinese Goshawks (*Accipiter soloensis*). We found the largest number of Gray-faced Buzzards passed through our monitoring sites between March 21 and 24, and the peak for Chinese Goshawk was around April 25. Also, spring raptor migration season is more strung out and less predictable in time than in autumn. Our study confirmed that Henchun Peninsula was important to migrating Gray-faced Buzzards and Chinese Goshawks in spring. Probably due to the unstable spring weather pattern of this area, spring roosting sites and migration routes were highly changeable, making long term census and between year comparisons more difficult than in autumn.

DISTRIBUTION, HABITAT SELECTION, AND POPULATION ESTIMATION OF THE TAWNY FISH-OWL IN TAIWAN

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We investigated the distributional pattern, habitat selection and population status of the Tawny Fish-owl (*Ketupa flavipes*), a CITES II species, in Taiwan. We compiled field records from between 1993 and 2006 from all possible sources. We used GIS and a known territory length (6.2 km river section) to evaluate habitat selection for a total of 91 verified owl territories. Furthermore, we used GIS to estimate the number of potential owl territories for the whole island. Concerning habitat selection, owls used natural forests more than availability, and avoided other types of habitat (Bonferroni's Z test, P=0.05). The altitudinal range of the owl was from 48 to 2,407 m.a.s.l. The altitudinal limit was the highest in the central part of Taiwan, and decreased gradually down to the north and south ends of the island. Such variation in altitudinal distribution is most likely due to the Massenerhebung effect. On the other hand, the lower altitudinal limit was about 500 m higher on the west side than that on the east side of the island. The discrepancy is mainly due to the intense development of lowland forests on the west side of the island for the past 400 years. A total of 464 potential owl territories were estimated in Taiwan, but half of them were not located within protected areas. We suggest establishing protected areas, which include lowland riparian forests in northeastern Taiwan because this is the only place where the Tawny Fish-owl can live close to the sea.

Workshop on Raptor Research and Management Techniques

The 6th International Conference on Asian Raptors features a workshop on raptor research and management techniques with presentations given throughout the conference, and opportunities for hands-on field experience in Hustai National Park. The workshop is open to all registered conference delegates and is organized in partnership with The Peregrine Fund, ARRCN, Mongolian Ornithological Society and the Ornithological Laboratory, National University of Mongolia, with funding provided by the Trust for Mutual Understanding.

The workshop includes lectures and hands-on field instruction from some of the world's most renown raptor biologists, including Prof. Ian Newton (Population Ecology of Raptors) and authors from the latest edition of "Raptor Research and Management Techniques" manual. The workshop has something for everyone, from students to experienced biologists alike, and includes valuable information, from cutting-edge tracking technology to important standards for understanding change in raptor populations, and a great deal more.

The concept for this workshop arose during the 5th ARRCN conference in Vietnam in April 2008. The exuberant enthusiasm of over 100 young raptor biologists drawn together from all over Asia was exciting and infectious, and the opportunity at the next conference in Mongolia to marry this enthusiasm with experience and knowledge was clear and compelling. The publication of the new manual "*Raptor Research and Management Techniques*" and the presentation of a workshop by some of the authors at the Raptor Research Foundation meeting in 2008 offered the ideal solution. We set out to recruit the experience of leading raptor biologists and bring them to the ARRCN conference in Mongolia.

Leonard Young, President of the Raptor Research Foundation, in his forward to *Raptor Research and Management Techniques,* expressed the logic perfectly when he wrote, "Editors David Bird and Keith Bildstein, experts in their own right, have assembled a distinguished team of authors. The techniques they have synthesized are the product of hundreds of lifetimes of hard-won experience, thousands upon thousands of hours of trial and error, and tedious experimentation. As the ballet master, George Balanchine put it, *"Behind every good idea lies horrible, exhausting work. You knock your brains out and nothing comes. ... But after you've worked hard enough, the work gradually starts taking shape."* (Volkov 1985, page 199 *in* Balanchine's Tchaikovsky: Interviews with George Balanchine. Simon and Shuster, New York, New York, USA). Take advantage of the experience gathered in these pages. For established practitioners, this is a tremendous resource to brush up on technique and review recent developments. For those at the start of their careers, this is a toolbox with which to build a life's body of work, implements shaped for your use by those who have walked the road you are standing on."

The goal of these workshop presentations is to provide conference delegates the toolbox with which to build a life's body of work using implements shaped by those who have walked the road now traveled by a super enthusiastic generation of biologists in Asia. The talent and passion is already there; this workshop will join them with the experience and advice of many lifetimes of work gathered and represented by the workshop speakers.

Workshop Speaker Biographies

Dr. **Keith L. Bildstein** is Director of Conservation Science at Hawk Mountain Sanctuary in Orwigsburg, Pennsylvania, where he oversees Hawk Mountain's conservation science program, and coordinates the activities of the Sanctuary's graduate students, international interns, and visiting scientists. Keith received a B.S. in Biology at Muhlenberg College, in Allentown, Pennsylvania, in 1972, and a 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 eight international ornithological meetings. He has authored or coauthored more than 100 papers in ecology and conservation, including 50 on raptors. His books include *White Ibis: wetland wanderer* (1993), *The raptor migration watch-site manual* (1995 [with Jorje Zalles]), *Raptor watch: a global directory of raptor migration sites* (2000 [with Jorje Zalles]), and *Migrating raptors of the world: their ecology and conservation* (2006). His co-edited works include *Conservation Biology of Flamingos* (2000), *Hawkwatching in the Americas* (2001), *Neotropical Raptors* (2007), *Raptor Research and Management Techniques* (2007), and *The State of North America's Birds of Prey* (2008). Keith's current research involves the geography, ecology, and conservation of the world's migratory raptors; energy management in migrating raptors; the feeding and movement ecology of New and Old World vultures; and the wintering, breeding, and movement ecology of American Kestrels.

Dr. **Martin Gilbert** has been working as a veterinarian in the field of wildlife conservation for ten years. He spent four years in Pakistan with The Peregrine Fund, working on the field investigation into the catastrophic declines that have devastated vulture populations across the Indian subcontinent. This

work ultimately led to the finding that veterinary use of the non-steroidal anti-inflammatory drug diclofenac was responsible for the vulture declines and enabled the implementation of mitigating strategies. In 2004 Dr Gilbert joined the Wildlife Conservation Society in Cambodia, where he continued his work with vultures and initiated wildlife health projects including Mekong dolphins, turtles and the wildlife trade. He is now in the position of WCS-Global Health Program, Associate Director - Asia and continues to work on and supervise wildlife health projects in Mongolia, Cambodia, Vietnam, Laos PDR and Indonesia.

William Heinrich is a native of Colorado where his interest in raptors developed through falconry. He has actively worked with birds of prey for over 45 years. His professional career began in 1975 when he worked as a seasonal raptor biologist for the Colorado Division of Wildlife. In 1976 he began working full time for The Peregrine Fund, finished his college education, and became responsible for the organization's Peregrine Falcon, Aplomado Falcon, and California Condor release programs. In addition to managing the release programs throughout the western United States, Bill has studied raptors internationally and given lectures in 13 countries including: Bahrain, Canada, Colombia, Greenland, Guatemala, Italy, Japan, Mexico, Panama, Poland, Spain, United Kingdom, and Zimbabwe.

Lloyd Kiff graduated from Marshall University in 1964 and conducted graduate studies at the University of California, Los Angeles, where he earned a Master's degree in Zoology. He was Curator and Director at the Western Foundation of Vertebrate Zoology in Los Angeles from 1968-1994, and during the late 1980s, he also served as the Curator of Ornithology at the Natural History Museum of Los Angeles County. During his museum career, he led collecting expeditions to 16 tropical countries on four continents. He was the Team Leader of the California Condor Recovery Team from 1986-93 and was a member of the Western Peregrine Falcon Recovery Team from 1989-1994. He was also president of the Cooper Ornithological Society in 1993-94 and later served on the Council of the American Ornithologists' Union. He is an Honorary member of the Cooper Ornithological Society and a Fellow of the American Ornithologists' Union. Since 1994, he has been employed by The Peregrine Fund, where he supervises the research library and specimen collections, and manages the Global Raptor Information Network ("GRIN") website.

Dr. **Todd Katzner** is Director of Conservation and Field Research at the National Aviary in Pittsburgh and is Adjunct Assistant Professor of Biology at the University of Pittsburgh and at Duquesne University. He received his B.A. in Biology from Oberlin College in 1991. He received his M.S. in Zoology and Physiology from the University of Wyoming, where he studied the winter ecology of pygmy rabbits. He received his Ph.D. in Biology in 2003 from Arizona State University, where he studied the ecology of a community of eagles at the Naurzum National Nature Reserve in north-central Kazakhstan. He received an NSF postdoctoral fellowship to study demography of eagles and vultures at Imperial College London. Todd has studied the ecology and demography of birds of prey

since 1997. His work with raptors has focused on developing novel techniques for non-invasive demographic studies, especially focused on eagles and vultures, and on developing novel techniques for advanced, high-frequency telemetry systems for raptors. Most of his research has taken place in Eurasia (Kazakhstan, Georgia, Philippines) and North America. In addition to his research, Todd teaches at the University of Pittsburgh and at Duquesne University and he supervises three graduate students.

Prof. **Ian Newton** has recently retired from the Natural Environment Research Council in the United Kingdom. He has worked for the past 40 years on the population ecology of birds, especially raptors, including a 30-year study of the Eurasian Sparrowhawk. In this time, he has published about 300 papers in the scientific literature, and seven books. The books include *The population ecology of raptors* (1979), *Population limitation in birds* (1998), and most recently *The migration ecology of birds* (2008). He is a past Chairman of *The Royal Society for the Protection of Birds* in the United Kingdom, and of *The Peregrine Fund* in the United States, and is that current Chairman of *The British Trust for Ornithology*. He is also a past President of the *British Ecological Society* and of the *British Ornithologists' Union*.

Dr. **Rick Watson** is Vice President and International Programs Director of The Peregrine Fund. He received his B.Sc. in Marine Zoology from the University of Bangor, North Wales, United Kingdom in 1979, and Ph.D. in Raptor Ecology from the University of the Witwatersrand, South Africa in 1986. Rick has worked for The Peregrine Fund since 1990, initially to establish the Madagascar Project to study and conserve three of the world's most endangered birds of prey. This work led to the rediscovery of two of these species, thought to be extinct, and the establishment of an 810 square mile national park, Madagascar's largest, to protect their rain forest habitat. It also led to the establishment of innovative community-based conservation projects to protect wetlands essential for the endangered Madagascar Fish-Eagle. He developed a new program for raptor research and conservation Africa, establishing and supervising new projects throughout Africa. These included Bearded Vulture reintroduction to Kenya, Cape Vulture conservation in South Africa, raptor conservation and local capacity building in Zimbabwe, Kenya and Ethiopia, and Crowned Eagle conservation in Ivory Coast. In 1998 he was appointed International Programs Director, responsible for all programs and projects outside of the United States, and currently supervises 18 projects in Asia, Africa, and Latin America. He was appointed Vice President of the organization in 2007. He supervises U.S. and local graduate students at Masters and Ph.D. levels and is adjunct faculty at Boise State and Idaho State Universities. Rick has authored and co-authored over 120 publications and most recently edited the proceedings of the conference *Ingestion of lead from spent ammunition: Implications for wildlife and humans*.

Workshop Abstracts

MIGRATION-WATCHSITE COUNTS

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Raptors are secretive, wide-ranging, and highly mobile avian predators whose regional populations can be logistically difficult and financially prohibitive to survey and monitor. One potentially cost-effective method for monitoring regional populations of raptors is sampling their numbers during migration at one or more watchsites along traditional migration corridors. Today, more than 300 raptor-migration watchsites, including those in Eilat, Israel; the Strait of Gibraltar in southern Spain; Falsterbo, Sweden; Champhon, Thailand; and Hawk Mountain, U.S.A. attract hundreds to tens of thousands of visitors annually. Counts of raptors at established migration watchsites have been used to study the ecology of migrating raptors since the late nineteenth century. Counts of visible raptor migration at watchsites have helped determine the conservation status of migratory populations of raptors in NorthAmerica, Europe, the Middle East and, most recently eastern, Asia. In addition to their value in monitoring regional populations of raptors, migration counts also have helped identify principal migration routes, assess the phenology of raptor migration, and determine the extent to which weather affects migration. Direct visual observations associated with migration counts also have yielded valuable information on the behavior of migrating raptors, including the relative use of flight patterns (e.g., soaring versus flapping flight), flocking behavior, interspecies interactions, and roosting behavior en route. Because they are cost-effective and relatively easy to implement, migration counts remain one of the most commonly used methods in raptor migration science. In this presentation I detail the rationale and methods involved in sampling the visible migration of raptors at established raptor-migration watchsites (including the means by which watchsites are identified), guidelines for data recording, information on the ways in which migration-count data can be stored for later analysis, and how resulting status- and trends-data can be communicated to the scientific community. I then discuss migration counts within the perspective of long-term monitoring, presenting and exploring the use of such counts as indexes of regional population trends.

ROADSIDE SURVEYS

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Regional populations of open-habitat raptors can be surveyed using road surveys in open areas. In addition to assessing and monitoring the regional distribution and abundance of open-habitat raptors, roadside surveys, which date from the early 1900s, can be used to determine species-specific differences in habitat-use, diet, hunting behavior, and perch use. When conducted seasonally, they also can be used to determine seasonal shifts in the abundance of migratory species. Geographically expansive roadside surveys have been conducted in North and South America, Europe, Africa, and central Asia (Kazahkstan). Surveying raptors from the road usually involves a driver and one or two additional observers traveling in a vehicle at 30-60 kilometers per hour, while counting all raptors seen within a specific distance from the road. Survey routes should be designed thoughtfully and mapped carefully before the first survey is conducted. Although raptors can be surveyed from primary, secondary, and even tertiary roads, care should be taken regarding existing traffic patterns and the "stability" routes that are to be used in long-term studies. In this presentation I detail the rationale and methods involved in surveying and studying raptors on roadside, including their establishment; guidelines for data recording; information on the ways in which migration-count data can be stored for later analysis, and how resulting status and trends data can be communicated to the scientific community. I then discuss roadside surveys within the perspective of long-term population monitoring, presenting and exploring the use of such counts as indexes of regional population trends.

INVESTIGATION OF RAPTOR MORBIDITY AND MORTALITY: INTERPRETING FINDINGS ON INDIVIDUAL AND POPULATION SCALES

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As large and enigmatic species, reports of ill health and death in raptors are comparatively more common than in other taxonomic groups. Information collected from moribund or dead raptors may have significance beyond that of

the individual concerned, but can also indicate wider problems, with effects for whole populations. Raptor biologists are often among the first to detect incidents of raptor morbidity or mortality, and as such have the opportunity to initiate investigations and collect information that may be used to determine the cause of the bird's condition. Complete investigations usually require integration with specialists in veterinary medicine and diagnostic disciplines such as pathology, toxicology, and microbiology. Access to such expertise and facilities varies greatly in Asian countries, but support networks such as the IUCN Veterinary Specialist Group (http://www.iucn-vsg.org), can aid in connecting researchers with appropriate experts. The objective of this presentation will be to introduce raptor biologists to the principal tools necessary for initiating investigations of raptor mortality events, covering collection of relevant data, examination of carcasses and linkage with other professionals. Ultimately, advances in our understanding of the factors leading to raptor mortality, particularly those impacting populations, will enhance our ability to identify measures to mitigate these threats and benefit species conservation.

RAPTOR TRAPPING AND HANDLING TECHNIQUES FOR SCIENTIFIC RESEARCH

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Birds of prey have been trapped and handled for thousands of years for use in the sport of falconry, the art of hunting with trained raptors. More recently raptors are still being trapped for falconry, but also for scientific research purposes to include: banding (ringing), migration, telemetry and genetic studies, as well as drawing blood for disease detection. This talk will demonstrate some safe trapping and handling methods. The trapping techniques will include the use of the traditional lure pole and bow net, as well as the use of the Bal-chatri, Dho-Ghaza, and the pigeon harness. All of these traps require that the research biologist be present at all times to insure the safety of the birds. Safe handling requires that that the raptors are held for a minimum amount of time before being released using safe and proven techniques. Minimizing stress and injury are essential and can be accomplished with light weight restraining cloaks such as the abba and traditional falconry hood which prevents birds from struggling, or seeing. I will be discussing some of the research that I have been involved with through the years from trapping Gyrfalcons and Peregrines in Greenland, to most recently trapping migrating Peregrines on the Gulf Coast of Texas in the US.

MARKING AND TRACKING METHODS FOR BIRDS OF PREY: WHY DO IT AND WHAT OPTIONS ARE AVAILABLE

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Marking and tracking birds of prey is essential for most studies of raptor ecology, whether monitoring, demographic studies, disease ecology or conservation programs. In this presentation I will review some of the history of marking and tracking birds of prey, look at some of the modern tools used to mark and track birds and highlight some of the new frontiers in marking and tracking. In discussing marking, we will address some of the original tools used to mark birds – ringing and banding – and then move into more modern techniques including wing-tagging and feather marking. Finally we will discuss some of the cutting-edge non-invasive genetic marking techniques that are changing the way we view raptor ecology. In discussing tracking we will focus on telemetry, starting with classical radio-telemetry and then discussing more modern satellite-based track monitoring and stable isotope techniques that have provided remarkable insight into raptor movements. Finally, we will address some of the cutting-edge GSP-GSM telemetry systems that are currently being developed and also identify. We will conclude with a feasibility analysis, identifying what marking and tracking techniques are right for what research questions and budgets. If time permits, we will also discuss methods of habitat and diet analysis for birds of prey. Again, this will focus on some of the historical approaches (vegetation measurement, pellet analysis) as well as more modern techniques (satellite imagery and stable isotope analysis). This component will also include a feasibility analysis geared towards identifying habitat and diet analysis techniques right for the research question and budget at hand.

HIGH FREQUENCY GPS-GSM TELEMETRY FOR STUDY OF MOVEMENT ECOLOGY OF RAPTORS

Todd E. Katzner[1], Tom Anderson[2], Trish Miller[3], Michael Lanzone[4]

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Satellite telemetry has in recent years become the standard for tracking birds of prey. Modern, satellite telemetry units collect data at hourly intervals, generally no more than about 12-15 data points per day. While these units have allowed researchers to track animals across the world and have provided remarkable insight into the natural history and biology of wildlife, many questions cannot be adequately answered with such a limited frequency of data collection. Additionally, once deployed, researcher communication with and reprogramming of these units is not possible. To address these problems, we developed a lightweight GSM tracking device capable of collecting data at user determined intervals as small as 30-seconds. An additional benefit of this new technology is that it allows real-time communication and re-programming of the device post-deployment. In addition, our software allows programming of multiple geofences, for changing rates of data collection and rates of data download. The fine scale resolution of these tracking data opens up new horizons in the field of telemetry studies and also allows for validation and refinement of models describing animal behavior, home range and movement. To illustrate the capabilities of this new technology we present preliminary track data collected from golden eagles in the eastern USA and we compare them with satellite telemetry tracks collected in the same region.

THE RAPTOR LITERATURE IN THE 21ST CENTURY

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This presentation provides an overview of the types of scientific literature of interest to raptor biologists and a discussion of current options for accessing that literature. The business of scholarly publishing is presently in dynamic transition from print to electronic mode. Most of the important technical journals for raptor biologists are now available in electronic form, or soon will be, and most dissertations and theses can be accessed online. However, most books, back issues of minor journals, many useful reports and monographs, and publications in languages other than those used most widely in Western Europe, North America, and larger Asian countries, are still unavailable in electronic form. Despite proposals by Google and certain non-profit or governmental entities to convert all useful printed materials to electronic form and make them available on the web, this goal will not be reached soon, judging from the current pace of conversion. In addition, access to the most important databases of electronic literature is still prohibitively expensive for all but the employees or associates of large universities, governmental agencies, or the largest non-government organizations, and this can represent a serious limitation to some conservation projects. The huge amount of information already available in web-based databases can be overwhelming, and some have suggested that we are descending from the Information Age into a world of Information Chaos. Databases focused specifically on raptor biology, including the Raptor Information System and the Global Raptor Information Network, are invaluable because they organize a vast amount of information on raptors into single website databases searchable by keywords. Internet technology is now essential for information transfer and efficient data storage, especially for individuals lacking access to the resources of a large library, but the maintenance of print libraries is still important for archival purposes.

STUDYING POPULATION ECOLOGY: ASSESSMENT OF PRODUCTIVITY AND SURVIVAL

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Studies of the population ecology of raptors are important, not only for their fundamental scientific interest, but also because they underpin conservation. To manage any species in the long term, it is important for us to understand which external factors limit its numbers, and influence its breeding success and survival. Only then can effective conservation measures be put in place. This talk will concentrate on the measurement of breeding density, breeding success and annual survival in raptors, and on how to obtain reliable and unbiased information on each aspect. It will also discuss the external factors that influence the breeding densities, productivity and survival of raptors, including the roles of food-supplies, nest sites, predation, human interference and other factors. Understanding these limiting factors is not always easy, especially in migratory species because their numbers can be influenced by factors acting anywhere along the migration route - in breeding, migration or wintering areas. In recent decades, many species seem to have been limited primarily by factors acting in their breeding areas, and other species by factors acting on their migration routes or in their wintering areas. The talk will be illustrated by examples drawn mainly from studies on various species in Europe and North America.

CRITICAL ELEMENTS FOR EFFECTIVE RAPTOR CONSERVATION

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The Peregrine Fund has conducted raptor conservation projects worldwide for 40 years. We have identified several elements that are consistently important for successful raptor conservation. These include a scientific understanding of the species' status and factors limiting its distribution and abundance. The latter usually requires quantitative studies on the species' population ecology and behavior which typically precede conservation interventions. If the species is in decline, the cause must be resolved before conservation can be successful but, in some cases, experimental restoration may be initiated even before the cause is known and reintroduced birds studied to learn what factors limit their survival. A well defined and achievable conservation goal helps focus effort on conservation actions that will make a measurable difference. Such interventions must be adapted to the goal and methods have usually involved species restoration of critically endangered species, habitat protection, and public awareness to reduce persecution and other anthropogenic effects such as use of pesticides, poisons, and drugs. Sufficient funding over time is one of the most important resources needed, but talent is just as important and often overlooked. Talent includes people with the knowledge, experience, passion, drive, and determination to be successful. Developing talent locally is important for success, but finding the right mix of knowledge and passion is often difficult, especially in developing nations where conservation is considered a luxury by the rural poor, and well-educated individuals prefer desk-jobs in the city near the comfort of home. Other useful elements include organizational support, a method for annually evaluating results, and a strategy that includes adaptive management of the project as new information is gained. We have found that working collaboratively with people who may be responsible for the species' demise produces better, long-term results than confrontation and litigation, and a cooperative philosophy also appeals to land owners and donors. Laws can be either beneficial or detrimental to conservation results, even if they were intended to be beneficial, and should be introduced sparingly and only after voluntary compliance has been tested and failed. These elements will be described and explained in the context of four critically endangered species and one vulnerable species: Peregrine Falcon recovery, successfully completed; California Condor recovery, a successful project that is ongoing and still responding to new information; Asian *Gyps* vulture population crash, which presents some new challenges; Madagascar Fish Eagle conservation, to illustrate conservation success in one of the world's poorest nations; and Harpy Eagle conservation which aims to avoid species endangerment before more expensive interventions are needed. I will conclude with an example

of an experimental conservation project on the critically endangered Ridgway's Hawk in Dominican Republic.

WILDLIFE TRACKING WITH ARGOS

Aline Duplaa

CLS (Collect and Localisation by Satellite)

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Argos is a unique worldwide location and data collection system dedicated to studying birds and protecting the environment. Argos helps the scientific community to better monitor and understand our environment. The Argos system was created in 1978 by the French Space Agency (CNES), the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA), originally as a scientific tool for collecting and relaying meteorological and oceanographic data around the world. In 1986, CNES created a subsidiary, CLS, to operate, maintain and commercialize the system. Currently, several other international space agencies also actively participate in the Argos system including Eumetsat (European Organization of the Exploitation of Meteorological Satellites), the Indian Space Research Organization (ISRO) and others. Thousands of animals, including birds, marine and land animals, are fitted with miniaturized Argos transmitters and tracked worldwide. The position information combined with data collected by sensors allows biologists to better understand animal's behavior, feeding strategies, breeding and adaptation to their environment. Such observations provide the basis for conservation measures aimed at helping many endangered species. In addition to its ecological value, this work allows the international community to learn more about our environment's natural resources and interactions between humanity and wildlife. ARGOS is a system that is expanding and new technological developments allow the study of smaller species of birds, which was just not possible only a few years ago.

Questionnaire to participants in the workshop on Raptor Research and Conservation Methods:

Please write your comments below on the content, quality, and scope of presentations and field experience provided by authors of the workshop during the 6th ARRCN conference. Including your name and email address is voluntary. Return this page to me during the conference or by July 1st by email at: rwatson@peregrinefund.org.

Thank you for your time.

ASIAN RAPTORS

Science and Conservation for Present and Future

The 6 th International Conference on Asian Raptors

23-27 June 2010

Ulaanbaatar, Mongolia