Saker Falcon projects

currently implemented by

International Wildlife Consultants Ltd.

on behalf of the

Environment Agency – Abu Dhabi

MONGOLIA

General Overview

We have been engaged annually in survey and/or research work on Saker Falcons in Mongolia since 1998. Currently, our studies in Mongolia are undertaken under a 5-year MoU (2010-15) between the Ministry of Nature, Environment & Tourism (MNET, Mongolia), the Environment Agency-Abu Dhabi (EAD) and International Wildlife Consultants Ltd (IWC), and are focussed on (i) developing a long-term Saker Falcon conservation programme based on sustainable use and (ii) reducing electrocution rates at electricity distribution lines. Our research partner in Mongolia is the Wildlife Science and Conservation Center (WSCC). Within the current research framework we are undertaking the following studies:

Satellite tracking:

Migratory movements of Saker Falcons (*Falco cherrug*) from Mongolia and adjacent regions of Russia revealed by satellite telemetry

Satellite tracking data of 11 adults and 9 juvenile Sakers. Information gained on migration behaviour (varied from sedentary, short-distance migrants and long-distance migrants), wintering areas (identified Qinghai-Tibetan Plateau, China as important wintering area) and migration pathways (direction, speed and use of stop-over sites).

Staff: Dr. Andrew Dixon & Dr. Nick Fox

Participating organisations: IWC; National University of Mongolia; Center of Field Studies, Nizhniy Novgorod.

Period of project: 1997-2007

Status: Manuscript in preparation.

Post-fledging dispersal behaviour and survival of Saker Falcons (*Falco cherrug*) from artificial and natural nest sites in the central Mongolian steppe

Based on data obtained from satellite telemetry, radio-tracking and visual observation of fledglings with patagial tags. Information gained on behaviour (distance moved from nest, home range size and brood cohesion) and survival (weekly survival rate) from fledging to dispersal from natal area.

Staff: Dr. Andrew Dixon, Dr. Lutfor Rahman, Gankhuyag Purev-Ochir, Nyambayar Batbayar, Mark Etheridge

Participating organisations: IWC; WSCC; University of Aberystwyth.
Period of project: 2006-2010
Status: Manuscript in preparation.

Ranging behaviour of breeding Saker Falcons (*Falco cherrug*) at artificial nest sites in central Mongolia investigated using GPS satellite telemetry
Based data derived from 15 breeding adults fitted with GPS satellite transmitters at our Artificial Nest Experimental Area in 2009-10. Information gained on variation in ranging behaviour related to sex, stage of the breeding cycle and prey availability.
Staff: Dr. Andrew Dixon, Dr. Lutfor Rahman, Gankhuyag Purev-Ochir, Nyambayar Batbayar, Yozora Tadehara
Participating organisations: IWC; WSCC; Boise University.
Period of project: 2009-2010
Status: Data analysis on-going for MSc project based at Boise University, USA.

Post-breeding movements of Mongolian Saker Falcons (*Falco cherrug*) derived from GPS satellite telemetry
Based data derived from 15 breeding adults fitted with GPS satellite transmitters at our Artificial Nest Experimental Area in 2009-10. Information gained movements of breeding birds outside the breeding season.
Staff: Dr. Andrew Dixon, Dr. Lutfor Rahman, Gankhuyag Purev-Ochir, Nyambayar Batbayar
Participating organisations: IWC; WSCC.
Period of project: 2009-2011
Status: Data analysis on-going.

Movement and habitat use of Saker Falcons (*Falco cherrug*) from the Galba Gobi Important Bird Area, southern Mongolia
Based on data derived from one breeding adult and two juveniles fitted with GPS satellite transmitters in the Galba Gobi IBA in 2009. Information gained on habitat use and movement behaviours of birds in a region subject to mining development.
Staff: Nyambayar Batbayar, Dr. Andrew Dixon, Gankhuyag Purev-Ochir, Bayarjargal Batsukh, Jonathan Stacey.
Participating organisations: IWC; WSCC; BirdLife International.
Period of project: 2009-2011
Status: Data analysis on-going.

Artificial Nests:

The use of artificial nest sites to increase the breeding population of Saker Falcons (*Falco cherrug*) in nest site limited steppe habitats of Mongolia

Based on data from two Artificial Nest Experimental Areas over the period 2006-11. Information on occupancy rates (in relation to nest design), breeding density (in relation to rodent availability), breeding dispersal (nest site fidelity) and nesting success (Mayfield analysis of incubation and nestling stages).

Staff: Dr. Andrew Dixon, Dr. Lutfor Rahman, Gankhuyag Purev-Ochir, Nyambayar Batbayar, Mark Etheridge, Dr. Nick Fox

Participating organisations: IWC; WSCC; University of Aberystwyth (UK)

Period of project: 2006-2011

Status: Manuscript in preparation.

Diet and prey availability:

Breeding biology and diet of Saker Falcons (*Falco cherrug*) in Mongolian steppe habitats with low and high density rodent populations

Based on data from two Artificial Nest Experimental Areas. Information on laying date, clutch/brood size, nesting success and diet (based on pellet analysis) in relation to rodent availability.

Staff: Dr. Andrew Dixon, Dr. Lutfor Rahman, Ariunzul Lhagvajav, Gankhuyag Purev-Ochir, Amarsaikhan Saruul; Nyambayar Batbayar, Mark Etheridge, Nedko Nedyalkov

Participating organisations: IWC; WSCC; National University of Mongolia; University of Aberystwyth (UK); Bulgarian Academy of Sciences.

Period of project: 2007-2008

Status: Manuscript in preparation.

Diet of breeding Saker Falcons (*Falco cherrug*) in relation to temporal and spatial variation in prey availability in the central Mongolian steppe

Based on data obtained from Artificial Nest Experimental Area over the period 2007-12 (temporal variation in prey availability & diet) and from 20 grids of artificial nests over the period 2011-12 (spatial variation in prey availability & diet). Prey

availability assessed by means of transect counts and diet assessed from pellet analysis.
Staff: Dr. Andrew Dixon, Dr. Lutfor Rahman, Ariunzul Lhagvajav, Gankhuyag Purev-Ochir, Amarsaikhan Saruul; Amarkhuu Gungaa, Batbayar Galtbalt, Nyambayar Batbayar
Participating organisations: IWC; WSCC; National University of Mongolia
Period of project: 2007-2012
Status: On-going as part of an MSc project based at the National University of Mongolia.

Saker Falcon (*Falco cherrug*) feeding behaviour during the nestling period in the central Mongolian steppe
Based on 24 hour video camera analysis of feeding behaviour at artificial nests. Information on nest visit rates, prey type, brooding and feeding behaviour.
Staff: Dr. Andrew Dixon, Ariunzul Lhagvajav, Nyambayar Batbayar
Participating organisations: IWC; WSCC; National University of Mongolia
Period of project: 2010
Status: Manuscript in preparation as part of an MSc project based at the National University of Mongolia.

Nesting density and breeding success of Saker Falcons (*Falco cherrug*) in relation to spatial variation in prey availability in the central Mongolian steppe
Based on data from 20 grids of artificial nests across central Mongolia from 2011-12. Prey availability assessed by means of transect counts.
Staff: Dr. Andrew Dixon, Amarkhuu Gungaa, Dr. Lutfor Rahman, Gankhuyag Purev-Ochir, Batbayar Galtbalt, Nyambayar Batbayar
Participating organisations: IWC; WSCC; National University of Mongolia
Period of project: 2011-12
Status: on-going as part of an MSc project based at the National University of Mongolia.

Survival studies:

Turnover rates of breeding Saker Falcons (*Falco cherrug*) in a population subject to harvest for falconry

Based on data from one Artificial Nest Experimental Area over the period 2007-12. Breeding individuals identified by satellite tags, patagial tags and genetic markers. Annual breeding turnover rates based on sex, marker type and year. Provides a proxy measure for adult survival.
Staff: Dr. Andrew Dixon, Dr. Xiangjiang Zhan, Prof. Mike Bruford, Nyambayar Batbayar
Participating organisations: IWC; WSCC; Cardiff University (UK)
Period of project: 2007-12
Status: On-going.

Age and sex specific survival rates of Saker Falcons (*Falco cherrug*) in central Mongolia
We shall use breeding turnover in the population using our artificial nests as a proxy measure for adult survival. Individuals will be identified via genetic markers and we shall be able to detect cases of breeding dispersal within the network of artificial nests. Juvenile survival will be calculated through recovery of microchips (either as birds trapped, electrocuted or returning to breed).
Staff: Dr. Andrew Dixon, Dr. Xiangjiang Zhan, Prof. Mike Bruford, Nyambayar Batbayar
Participating organisations: IWC; WSCC; Cardiff University (UK)
Period of project: 2007-15
Status: On-going in collaboration with Cardiff University.

Land-use:

The influence of land use and land cover on breeding Saker Falcons (*Falco cherrug*) in the central Mongolian steppe
Based on data from 6 grids of artificial nests in central Mongolia from 2012-13.
Staff: Dr. Andrew Dixon, Sarangerel Inchinkhorloo, Amarkhuu Gungaa, Dr. Lutfor Rahman, Gankhuyag Purev-Ochir, Batbayar Galtbalt, Nyambayar Batbayar
Participating organisations: IWC; WSCC; National University of Mongolia
Period of project: 2012-13
Status: On-going as part of an MSc project based at the National University of Mongolia.

Policy Development:

Scalar dimensions of environmental governance: conservation, trade and the Saker Falcon (*Falco cherrug*) in Mongolia
A study to identify the policy developments required to support a system of conservation through sustainable use of Sakers.
Staff: Dr. Andrew Dixon, Choikhand Janchivlamden, Dr. Caroline Upton
Participating organisations: IWC; University of Leicester.
Period of project: 2011-13
Status: On-going PhD project in collaboration with University of Leicester.

Power Lines:

Raptors and corvids breeding on power lines in the central Mongolian steppe
Based on surveys of electricity distribution and transmission lines. Breeding density influenced predominantly by pole type on both types of line.
Staff: Dr. Andrew Dixon, Gankhuyag Purev-Ochir, Nyambayar Batbayar
Participating organisations: IWC; WSCC.
Period of project: 2005-11
Status: Manuscript in preparation.

Electrocution of raptors in central Mongolia and Qinghai, China: implications for the globally threatened Saker Falcon (*Falco cherrug*)
Pole design main factor associated with electrocution risk, electrocution rates compared over the year and effectiveness of mitigation measures assessed.
Staff: Dr. Andrew Dixon, Amarkhuu Gungaa, Gankhuyag Purev-Ochir, Prof. Ma Ming, Nyambayar Batbayar
Participating organisations: IWC; WSCC; Xinjiang Institute of Ecology and Geography (China).
Period of project: 2009-12
Status: Manuscript in preparation.

A trial of mitigation measures to reduce raptor electrocution rates at electricity distribution lines in the Mongolian steppe

Having identified high raptor mortality rates at specific electricity distribution lines we are working with the Eastern Electricity Company to implement a range of mitigation measures including reconfiguration of hardware; use of perch deterrents and retrofitting of insulation. Over a 12-month period (2012-13) we shall record raptor electrocution rates at poles with and without modifications to assess efficacy of various techniques.

Staff: Dr. Andrew Dixon, Amarkhuu Gungaa, Batbayar Galtbalt, Nyambayar Batbayar, Rick Harness

Participating organisations: IWC; WSCC; EDM International Inc. (USA).

Period of project: 2012-13

Status: On-going.

Project background and future developments

The project provides employment for two staff (one biologist as Project Leader and one Project Administrator) in Mongolia. The project currently supports 3 MSc studentships based at the National University of Mongolia and a PhD studentship based at the University of Leicester, UK. We also provide undergraduate training opportunities for students on our field projects and seasonal work for support staff such as drivers. We have a policy of developing research and survey skills in Mongolia in order to increase capacity with the country for implementing conservation activities in the future.

In addition to the 250 nests erected in the Artificial Nest Experimental Areas we have erected a further 5000 nests in 20 different districts of central Mongolia (250 nests per district). Over the 5-year period 2011-15 we shall monitor these nests to obtain information on occupancy by Sakers and breeding success. Furthermore we shall collect data that will enable us to estimate rates of adult survival, juvenile survival and recruitment. This information will be used to determine a sustainable harvest quota. The quota will vary according to the age and sex of the individuals harvested; a higher proportion of older birds will reduce the quota as will a bias towards one sex over another.

Consequently, in order to balance the harvested off-take with productivity from the artificial nests we need to know the age and sex of harvested birds. Currently there is no way to determine this and we are working with the Mongolian administration to implement policy and procedures that would ensure that the age and sex of harvested Sakers is recorded and that each exported bird is individually recognisable, ideally with an implanted microchip. Furthermore, we are working to

get greater involvement and co-operation from trappers and traders as well as end users to implement this process.

There are policy issues that need to be addressed at an international and national scale. Furthermore, we also need to address issues at a regional and district scale; sustainable use must also have benefits for local communities. In addition to promoting policies that see direct benefits of the Saker Falcon trade pass down to district level, we have developed our own community School Links Project to run in parallel with the artificial nest monitoring. This project involves linking the school in each district where we have artificial nests to an international partner school/s. We have supplied teaching materials related to falcon conservation, the artificial nest project and falconry to the partner schools. In addition to increasing community awareness of the project, the international link will generate financial benefits through partner school fund raising.

We are a partner in a University of Leicester study (DEFRA/Darwin Initiative project 2012-15) headed by Dr. Caroline Upton, which will include some of our artificial nest study sites in an analysis of community perceptions, values and benefits from wildlife. This study will enable us to assess the efficacy and value of our School Links Project, the contribution of the Artificial Nest Project to a greater understanding and appreciation of wildlife among local communities, and the perception of local communities to the use of wildlife as a commodity.

Our studies have enabled us to gain a better understanding of how Saker Falcons respond to spatial and temporal variation in prey availability, yet to date we have not been able to conduct a study to investigate the impact of predation by Sakers (and other raptors utilizing artificial nests) on prey populations. There is a potential benefit for herdsmen and for rangeland management of using raptor predation to manage populations of rodent pests. We are currently discussing the options of developing such a study in collaboration with Dr. Olivier Gilg (University Burgundy, France) either in the Mongolian steppe or on the Qinghai-Tibetan Plateau, where there is a less complex predator-prey ecosystem.

CHINA

General Overview

We have undertaken exploratory survey work on Saker Falcons in China from 2001-08, visiting areas of Inner Mongolia, Xinjiang and the Qinghai-Tibetan Plateau. We found low density breeding population in Xinjiang but a higher density population on the Qinghai-Tibetan Plateau. In 2007 and 2008 we established a project in collaboration with the North West Institute of Plateau Biology (Chinese Academy of Sciences), Plateau Perspectives, Qinghai Electric and Madoi County Administration to initiate a study on the use of artificial nests in grassland management and to mitigate the problem of raptor electrocution on newly established electricity distribution lines. However, civil unrest in Qinghai and Tibet in 2008, meant that the Chinese government closed access to the region and similarly in 2009 access was again restricted on the 50th anniversary of the Tibetan uprising. Consequently, we suspended activities in the region until the situation stabilized. In 2011 a party of Chinese researchers (Beijing Normal University, Cardiff University) revisited Saker nests to collect blood samples and in 2012 we shall re-establish the planned research and conservation project for Saker falcons on the Qinghai-Tibetan Plateau.

The survey work conducted in China to date can be summarized as:

Population surveys:

Breeding Biology and Diet of the Long-legged Buzzard (*Buteo rufinus*) in the Eastern Junggar Basin of Northwestern China

Author(s): Wu Yi-Qun, Ma Ming, Xu Feng, Dimitar Ragyov, Jevgeni Shergalin, Liu Nai-Fa, and Andrew Dixon. 2008. *Journal of Raptor Research* 42(4):273-280.

Abstract: The eastern Junggar Basin in northwest China is a potential area of sympatry for breeding Long-legged Buzzards (*Buteo rufinus*) and Upland Buzzards (*B. hemilasius*). However, during a breeding season survey in 2005, the Long-legged Buzzard was the only species recorded present in this semi-desert region. The minimum breeding density within our survey area was 0.19 breeding pairs/100 km2 and all nests were located either on rock faces or clay cliffs. There was little overlap in the location of Long-legged Buzzard and Golden Eagle nest sites, possibly as a result of interspecific competition. We present here information on clutch size (mean 5 3.3 eggs), brood development, and fledging success (0.7 chicks per breeding pair), as well as on the diet during the breeding season. Mammalian prey, especially the great gerbil (*Rhombomys opimus*), made up most of the diet of Long-legged Buzzards.

Saker Falcon (*Falco cherrug*) breeding population in the Eastern Junggar Basin of Northwestern China

Staff: Dr. Andrew Dixon, Prof. Ma Ming, Dimitar Ragyov

Participating organisations: IWC; Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences; Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences

Period of project: 2005-06

Status: Data still to be analysed. Results of two seasons survey work in the eastern Junggar Basin, providing information on breeding density, nest site tenacity, nesting dispersion (in relation to nest site availability and other raptors), breeding success.

The importance of the Qinghai-Tibetan Plateau ecoregion for the globally Threatened Saker Falcon (*Falco cherrug*)

Staff: Dr. Andrew Dixon, Prof. Ma Ming

Participating organisations: IWC; Xinjiang Institute of Ecology and Geography

Period of project: 2007-08

Status: Data still to be analysed. Results of two seasons survey work on the breeding and wintering population of Saker Falcons on the Qinghai Tibetan Plateau, together with an analysis of their winter ranging behaviour derived from satellite telemetry, and an assessment of current threats posed by rodent poisoning, electrocution, habitat change and falcon trapping.

Future developments

In 2012 we shall re-establish links with our partner organisations in Qinghai in order to establish a project to (i) trial the use of artificial nests to increase predation rates on Plateau Pikas in order to reduce the need for expensive and ecologically damaging poisoning campaigns and (ii) trial the use of various mitigation measures on electricity distributions lines to reduce raptor electrocution rates and to increase awareness of the issue among Chinese electrical engineers.

KAZAKHSTAN

General Overview

We have been funding survey and research work in Kazakhstan since 1993. In recent years we have been providing annual funding for Dr. Anatoliy Levin to undertake his long-term survey and monitoring work, whilst additional funding has also been supplied for survey work in Kazakhstan by a Russian team led by Igor Karyakin (2003-05). Apart from funding the surveys undertaken by Dr. Levin through the Institute of Zoology and the Kazakhstan Bird Conservation Union we have also undertaken a pilot study (2010) to assess the potential for using GPS satellite telemetry to monitor mortality of Sakers in the country (specifically to identify mortality rates, the location of mortality events and the timing of mortality events), and we have been engaged in biological sample collection in conjunction with Dr. Levin's surveys (feather samples for a population genetic analysis, blood samples for a transcriptome study and pellets for a diet study).

The surveys conducted by Igor Karyakin and Dr. Levin have been the main source of data for population estimates and trends in Kazakhstan, in particular for the IUCN Red List assessment undertaken by BirdLife International. Whilst we have funded the survey work we have limited access to the survey data and have had little input into the survey methodology, data analysis or interpretation, which has been the responsibility of the principal investigators (Igor Karyakin and Dr. Levin). We are currently in discussion with the principal investigators regarding analysis of survey data in order to compare survey results of the same geographical areas from two different time periods.

Whilst population estimates with associated confidence intervals do not exist for Kazakhstan, the existing survey data clearly demonstrates a decreasing population trend. Furthermore, the paucity of autecological studies on the species in different areas of Kazakhstan means that understanding the causal factors in the declines is largely a matter of guesswork based on anecdotal information. Habitat change and associated prey loss has been implicated in Saker declines in Kazakhstan (Watson & Clarke, 2000, *British Birds* 93; 136-143), but the consensus opinion among conservationists is that trapping for falconry is the main factor driving Saker Falcon declines across all regions of Kazakhstan, but evidence to support this assertion is lacking. Apart from demographic studies undertaken in 1993-95 (Kenward *et al*., 2001, *J. Field Ornithology* 72; 244-257 and Kenward *et al*., 2007, *J. Wildlife Management*

71; 238-245) there is little information on survival or productivity of Sakers in Kazakhstan.

Tracking study:

Dispersal and migratory movements of Saker Falcons (*Falco cherrug*) in Kazakhstan

Staff: Dr. Andrew Dixon, Dr. Anatoliy Levin, Dr. Jacky Judas

Participating organisations: IWC; Kazakhstan Bird Conservation Union; Institute of Zoology, Kazakhstan Academy of Sciences; National Avian Research Centre

Period of project: 2010-present.

Status: On-going. Based on a review of ringing and microchip recoveries, Argos satellite tracking of birds from Russia that moved into Kazakhstan and from the Sh. Zayed Release Scheme, GPS satellite tracking of juveniles fitted with PTTs in 2010 (one bird still transmitting).

Future developments

Whilst we recognize that accurate population estimates do not exist for Kazakhstan and this has meant that it is difficult to quantify population declines (e.g., for IUCN Red List assessment), it is nevertheless clear that the current trend is downward. Potential project developments in Kazakhstan are:-

- **An assessment of the genetic diversity of Saker Falcons in Kazakhstan**

The degree of phenotypic variation exhibited by Sakers across Kazakhstan is large, but it is not clear if there are populations (or even sub-species) that show specific adaptations to particular geographic regions. It is important to determine the existing genetic diversity of Sakers in Kazakhstan in order to know if there multiple population units that deserve conservation attention. We shall use a genome re-sequencing approach to assess the extent of regional adaptations across the Saker population in Kazakhstan.

Participating organisations: IWC; Cardiff University; BGI Shenzhen, China; Kazakhstan partner TBA

Period of project: 2013-14.

- **Demographic study of wild Saker Falcons in Kazakhstan**

In parallel with the development of a release programme, we shall examine the ecology, reproductive rates and survival of Sakers in the donor population/s. Using a combination of genetic markers and satellite telemetry we shall examine sex and age specific survival and determine the spatial and temporal patterns of mortality events for Saker Falcons. This information will enable us to get a greater understanding on the mechanism of population decline and to increase our understanding of the causal factors. Concurrent ecological studies to examine habitat use (via GPS satellite telemetry), prey availability and diet will provide detailed information on factors influencing breeding productivity and post-breeding survival.

Participating organisations: IWC; University partner TBA; Kazakhstan partner TBA

Period of project: TBA.

SOUTHEAST EUROPE

General Overview

The European Union Single Species Action Plan for the Saker Falcon (Nagy & Demeter, 2006) highlighted the fact that knowledge about Saker Falcons in Eastern Europe and the Balkans was limited and the population estimates for the region were based on low quality data. In response, the Central Laboratory of General Ecology, Bulgarian Academy of Sciences and IWC established the Southeast Europe Saker Network (SESN; http://www.cherrug.org) at an international workshop held in Sofia, Bulgaria in February 2006. The SESN aimed to develop capacity and interest in Saker Falcon conservation in the Southeast Europe region by providing small grants as 'seed-funding' for survey and conservation work.

Country studies:

BULGARIA

Feasibility study for Saker Falcon (*Falco cherrug*) reintroduction in Bulgaria

A feasibility study for a potential Saker Falcon reintroduction programme in Bulgaria was performed and published on-line. The feasibility study is based on IUCN criteria for reintroductions and includes the following issues:

- Historical Saker Falcon population status;
- Reasons for decline and extinction;
- Possibilities for natural recolonisation;
- Biology, ecology and habitat requirements of Saker Falcons;
- Release areas assessment (15 regions were investigated);
- Best practices and methods in raptor reintroductions;
- Taxonomic history of the Saker Falcon;
- Modelling of the effects of harvesting potential donor populations;
- Modelling of hypothetical new established population in Bulgaria;
- Criteria to judge success.

Publication: Ragyov D, Dixon A & Kowalczyk, K. 2011. Re-introduction of the saker falcon to Bulgaria, South-East Europe. Pp. 143-146. P. S. Soorae (ed.) *Global Re-introduction Perspectives*. IUCN/SSC Re-introduction Specialist Group.

Staff: Dimitar Ragyov; Kamilla Kowalczyk; Elena Kmetova, Yordan Koshev, Nedko Nedyalkov, Dr. Andrew Dixon

Participating organisations: Central Laboratory of General Ecology; Green Balkans Federation, IWC, Institute of Zoology, Bulgarian Academy of Sciences; National Museum of Natural History, Bulgarian Academy of Sciences; Helmholtz Centre for Environmental Research
Period of project: 2006-2009.
Status: Completed.

Preparatory developments for a Saker Falcon reintroduction programme in Bulgaria
We have built breeding aviaries and stocked them with Saker Falcons of European origin at the Green Balkans centre in Star Zagora. Additional staffing and training in avicultural skills has been provided to Green Balkans. In parallel, a hack site has been established on a cliff in the Central Balkans National Park and the first captive-bred birds (purchased and imported from Central European breeders) were released in 2011. Post-fledging monitoring was conducted via satellite telemetry. Over the period of the preparatory work, we shall trial different hack methods and hack sites to maximize post-release survival probabilities.
Staff: Dimitar Ragyov; Ivailo Klisurov, Dr. Andrew Dixon
Participating organisations: Central Laboratory of General Ecology; Green Balkans Federation, IWC, Central Balkans National Park
Period of project: 2006-2009.
Status: On-going.

Geographical variation in the diet and prey selection of Saker Falcons (*Falco cherrug*)
A PhD project (Nedko Nedyalkov) to examine variation in diet and prey availability in different parts of the Saker Falcon breeding range using original data (from Central Mongolia, Eastern Kazakhstan, Ukraine/Moldova and Turkey) and from a review of existing literature in additional regions.
Staff: Nedko Nedyalkov; Prof. Zlatozar Boev; Dimitar Ragyov; Dr. Andrew Dixon
Participating organisations: IWC; National Museum of Natural History, Bulgaria; Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences
Period of project: 2009-2012.
Status: On-going.

<u>TURKEY</u>

Population status of breeding Saker Falcons (*Falco cherrug*) in Turkey

Dixon, A., Ragyov, D., Ayas, Z., Deli, M., Demerdzhiev, D., Angelov, I., Kmetova, E. and Nedyalkov, N. 2009. *Avian Biology Research* 2 (4), 213-220.

Abstract: The Saker Falcon *Falco cherrug* breeds in Turkey and also occurs in the country during passage and in winter. Turkey represents the southwestern range limit of the global breeding distribution of the species and is relatively isolated from the neighbouring population centres in Europe and Central Asia. A review of literature and other record sources indicated that the 19th century breeding population in Thrace had disappeared by the 1950s, in line with dramatic declines in the Southern Balkans. We could find no data on the Saker Falcon population elsewhere in Turkey prior to the 1960s. In the 1960s, the Saker Falcon was a rare breeding species found mainly in steppe habitats of Central and Eastern Anatolia. Despite increased ornithological recording activity in the country, the number of Saker Falcon records declined in the 1980s and 1990s, probably because of habitat loss, a reduction in the Anatolian Souslik (*Spermophilus xanthoprymnus*) population and the activities of falcon trappers. A recent resurgence in records since 2000 probably reflects an increase in ornithological recording by resident and visiting ornithologists. Our survey in 2007 confirmed that the Saker is a rare breeding species in Central and Eastern Anatolia despite there being much apparently suitable habitat and prey available in these regions. It is not clear whether or not the Saker population in Turkey is currently held at a low level by anthropogenic factors or whether the low population size is a characteristic of an isolated population of a species occurring at the edge its global distribution range.

Educational outreach to combat the Saker Falcon trade in Turkey

The main aim of the project was to educate the law enforcement authorities about the critical status of the Saker Falcon in Turkey in order to encourage them to stop the illegal Saker Falcon trapping activities. A series of meetings with law enforcement authorities took place where educational materials (including a Turkish translation of the CITES Falcon Enforcement document) were distributed at lectures. Follow up meetings were be held with law enforcement officials after the trapping season in order to collect detailed information about the illegal activities by regions.

Publication: Anonymous. 2011. Combatting the illegal trapping and trade of falcons in Turkey. *Falco* 37; 14-17.

Staff: Anonymous

Participating organisations: Department of Forestry (Raptor Research Department), Istanbul University; Istanbul Bird Watching Society

Period of project: 2009.

Status: Completed

CROATIA

Saker surveys in Croatia

A power line survey was conducted in the Podravina, Posavina, Slavonia and Srijem (Syrmia) regions of Croatia. 3000 electric power poles and more than 1000 km of power transmission lines were explored. As a result the first two Saker Falcon nests on pylons in eastern Croatia were discovered. The survey revealed also 468 active nests of different bird species. Monitoring of the growth of the young birds was conducted as well as the first ringing of Saker Falcon in Croatia. The Drava Society performs educational activities in Croatian schools in order to increase the awareness of the youth about the importance of Saker Falcon conservation as well as preservation of biodiversity in Croatia. The Saker activities undertaken by Drava and instigated by SESN are now supported by various organizations such as Ministry of Culture in Croatia and the Embassy of Kingdom of Netherlands (see http://saker.pd-drava.hr). Project work of the Drava society is coordinated with the Croatian Electric Company and documented by the Croatian Television.
Staff: Ivan Darko Grlica; Dr. Andrew Dixon
Participating organisations: Drava Society; IWC
Period of project: 2007.
Status: Completed

MACEDONIA

Saker surveys in Macedonia

An expedition was conducted in 2007 aiming to check on reports of Saker breeding in the country. The survey revealed breeding by Lanner Falcons, but not Saker Falcons. A survey of historical literature and museum specimens indicated that Sakers were primarily found in Macedonia on passage and not as a breeding species.
Staff: Prof. Branko Micevski; Ognen Polenak; Dr. Andrew Dixon
Participating organisations: Institute of Biology; Association for Protection and Breeding Birds of Prey JARAK; IWC
Period of project: 2007.
Status: Completed

MOLDOVA

Saker surveys in Moldova

Annual survey and monitoring was established in 2006, collecting data on occupancy, breeding success and diet in order to improve knowledge about Saker biology in the region.
Staff: Dr. Nickolay Zubkov; Dr. Andrey Munteanu; Dr. Volodimir Tsurkanu; Dimitar Ragyov

Participating organisations: Institute of Zoology, Academy of Sciences of Moldova
Period of project: 2006-10.
Status: Completed

ROMANIA

Saker survey in Dobrudzha, Romania

A large scale survey was conducted in 2007 in Dobrudzha (SE Romania) aiming to assess the Saker Falcon population in the region. The area was divided into 90 (10x10 km) squares comprising the most proper potential Saker Falcon habitats. 87 of those squares were surveyed by researchers and two methods of survey were used: i) direct observation from a fixed point; ii) survey of suitable nesting sites such as electricity power lines, cliffs, solitary trees, mature forest edges. Results: 6 single birds were observed (5 of which positively identified as adults). Five of the records were in Northern Dobrudzha with only one from Central Dobrudzha. Additionally one pair with flying young was observed suggesting probable breeding in the area. Three nests are known in north Dobrudzha. The breeding success in 2007 was zero (none of the pairs raised young).
Staff: Robert Zeitz; Zoltan Domahidi; Dr. Alexandru Dorosencu
Participating organisations: Milvus Group; Danube Delta National Research Institute
Period of project: 2007.
Status: Completed

Saker survey in the Danube Delta and northern Dobrudzha, Romania

Survey work in 2008 was focused on the Danube Delta and. Suitable nesting sites such as power lines, heron and cormorant colonies, and White-tailed Eagle nests were explored. Four single birds were observed in the Delta in February, May, June and July from three locations. Three records in North Dobrudzha were made in three different locations in May. In 2008 only one pair managed to produce 2 chicks in North Dobrudzha.
Staff: Dr. Alexandru Dorosencu
Participating organisations: Danube Delta National Research Institute
Period of project: 2008.
Status: Completed

SERBIA

Saker surveys, research and conservation management in Serbia

Over three consecutive years (2007-09) teams conducted intensive surveys in north Serbia. The population in Vojvodina was estimated to be about 50-55 breeding pairs, with a stable population following increase in the 1980's. In order to provide stable nest sites for Saker Falcons, several dozen wooden nest boxes were erected on power lines in Vojvodina, in cooperation with Electricity Company 'Public Enterprise Elektromreza Srbije'. A diet study was conducted in 2007 and 2008 breeding season. Pellets and prey remains were collected from the ground around the nest. The analysis of the samples showed that Pigeons *Columba* sp. and European Hamster *Cricetus cricetus* are key prey species comprising 39% and 33% of prey items respectively.
Staff: Marko Tucakov; Slobodan Pusovic.
Participating organisations: Bird Study and Protection Society of Vojvodina; League for Ornithological Action, Belgrade; Institute for Nature Conservation of Serbia; Provincial Secretariat for Environmental Protection and Sustainable Development; Public Enterprise Elektromreza Srbije.
Period of project: 2007-09.
Status: Completed

SLOVAKIA

Saker survey and conservation management in Western Slovakia

Study involved conducting a survey to get a complete overview about the population of Saker Falcon in Western Slovakia and to create nesting opportunities for Saker Falcon in southwest Slovakia. This process will create a connection between Slovak and Hungarian Saker Falcon population through the nesting opportunities.
Publication: Chavko, J. 2010. Trend and conservation of Saker Falcon (*Falco cherrug*) in Western Slovakia between 1976 and 2010. *Slovak Raptor Journal* 4: 1–19
Staff: Jozef Chavko.
Participating organisations: Raptor Protection Society of Slovakia.
Period of project: 2010.
Status: Completed

UKRAINE

Saker surveys in Ukraine

From survey work in southern Ukraine a total of 218 breeding territories of Saker Falcons were revealed, 84 % of which were on electricity pylons, 15% on cliffs (mountain rocks and coastal precipices) and 1% on trees. Surveys were also

undertaken to identify power lines were a shortage of suitable nest sites was potentially limiting breeding opportunities for Saker Falcons.

Staff: Vitaly Vetrov; Yuri Milobog; Sergei Domashevski.

Participating organisations: Ukrainian Birds of Prey Research Center (http://raptors.org.ua/en).

Period of project: 2007-09.

Status: Completed

GENETIC ANALYSIS

General Overview

Genetic analysis has an important role to play in Saker conservation in that it enables us to identify and quantify biological variation within the species, which is critical in order to understand what 'population units' require conservation measures and to direct how we implement conservation management. Saker Falcon populations show little differentiation using mitochondrial and microsatellite markers (e.g., Nittinger *et al*. 2007. *Molecular Ecology* 16, 1497–1517), thus we have had to adopt a different approach based on Single Nucleotide Polymorphisms (SNPs) and whole genome sequencing in order to identify population variation at appropriate scales for conservation management.

Rapid genomic evolution and innovation in the predatory Peregrine and Saker Falcon

Whole genome sequences of Peregrine and Saker Falcon. The genome will provide an extremely valuable tool for Saker conservation projects and will form the basis of a genome resequencing project to be conducted in Kazakhstan and the process has resulted in the identification of an enormous number of informative SNP markers for population genetic analyses.

Staff: Prof. Mike Bruford, Xiangjiang Zhan, Shengkai Pan, Junyi Wang, Andrew Dixon

Participating organisations: IWC; Cardiff University; BGI Shenzhen (China)

Period of project: 2010-12.

Status: Completed, manuscript submitted.

Genetic variation among Saker Falcon (*Falco cherrug*) populations across Eurasia

SNPs were isolated from intronic sequences and exonic sequences using MHC and MC1R. Genetic population structure was compared between intronic and exonic SNP loci. Population variation was detected in MC1R and MHC, though the patterns reconstructed from these two sets of exonic SNPs were different.

Staff: Prof. Mike Bruford, Xiangjiang Zhan, Andrew Dixon, Janos Bagyura; Jozef Chavko,

Participating organisations: IWC; Cardiff University; MME BirdLife Hungary; Raptor Protection Society of Slovakia

Period of project: 2009-11.

Status: Manuscript in preparation.

Breeding turnover of Saker Falcons in Hungary and Slovakia

Project established as a co-operative endeavour in exchange for Central European samples to be used in the Saker population analysis across Eurasia. Genetic markers are used to identify individual breeding Sakers across years at breeding territories in Hungary and Slovakia. The data will provide information on breeding turnover rates.

Staff: Prof. Mike Bruford, Xiangjiang Zhan, Janos Bagyura; Jozef Chavko, Andrew Dixon

Participating organisations: Cardiff University; MME BirdLife Hungary; Raptor Protection Society of Slovakia; IWC.

Period of project: 2009-11.

Status: Data under analysis (difficulties in with degraded samples).

EDUCATION AND PUBLIC AWARENESS

General Overview

Issues relating to Saker conservation are often complex and are of relevance to a wide range of stakeholders of different nationalities, such bird protection and conservation organisations (NGOs), animal welfare organisations, veterinarians, falconry organisations, governmental agencies, intergovernmental agencies and other stakeholders that do not have organizational representation such as Arabian falconers, falcon breeders, falcon trappers and traders. Our education and public awareness projects include:-

The Middle East Falcon Research Group (MEFRG)

Production of a Website (www.mefrg.org) and the biannual Newsletter *Falco*. The MEFRG is a focal point for information exchange between biologists and veterinarians. Currently, we are reviewing the role of the MEFRG and the format of the *Falco* Newsletter.

Staff: Andrew Dixon, Tom Bailey

Participating organisations: IWC