Developing the Flagship Project for a Saker Falcon Portal and Network – Report for Year 1

Compiled by: Robert Kenward, Janusz Sielicki, Monif AlRashidi, Reza Parastar Namini, Kamran Khan Yousafzai and Nick Casey.

Lead: R.E. Kenward, Chair of IUCN thematic group on Sustainable Use & Management of Ecosystems

Steering: The Project is chaired by Nick P. Williams (UNEP Convention on Conservation of Migratory Species) and Adrian Lombard (International Association for Falconry and Conservation of Birds of Prey), and receives practical help from IUCN and BirdLife International. An advisory board consists of Margit Muller (Abu Dhabi Falcon Hospital), Monif AlRashidi (Hail University, Saudi Arabia), Mohammed Shobrak (Taif University, Saudi Arabia), Ian Burfield (BirdLife International), Salim Javed (Environment Agency Abu Dhabi), Mr Matyas Prommer (BirdLife Hungary) and Mr Janusz Sielicki (International Association for Falconry and Conservation of Birds of Prey).

Draft: 0.1

Date: 22 February, 2016

Acknowledgements

Recommended citation:

Kenward, R.E., Sielicki, J., AlRashidi, M.M., Namini, R.P., Yousafzai, K.K., & N.M. Casey (2016) Developing the Flagship Project for a Saker Falcon Portal and Network – Report for Year 1. UNEP-CMS Office, Abu Dhabi.

Table of contents

List of Tables

List of Figures

I. Foreword by chairs

The proposed solutions for the conservation of wildlife species for which consumptive use is considered a threat to their survival currently fall into two camps: those with protection-based views who believe that strict laws and enhanced enforcement provide the solution, whilst the alternative view is to embrace the use providing that it is properly managed and sustainable. The currently popular protection-based approach seldom considers and often ignores the wishes and concerns of the local people who live with the wildlife, who may also manage the land on which the wildlife depends, and whose own livelihoods may even rely upon the species concerned. With a species such as the Saker Falcon, which is migratory and occurs throughout a vast range covering at least 80 countries, the imposition of regulations and prohibitions on harvesting and use of the species is particularly difficult to implement and enforce. For these reasons, the Saker Falcon Task Force recognized the importance of considering a more holistic conservation strategy that extends beyond strict protection.

Indeed, the situation of the Saker Falcon is unique, in that it is a species which has been harvested sustainably from the wild, without domestication, for possibly 4000 years. Its use for falconry has become embedded in the culture of a number of nations. Falconry itself has been recognized as an Intangible Cultural Heritage of Humanity by UNESCO, with the largest number of submitting nations of any single element on the UNESCO list. Interestingly, several of these diverse nations are Saker Falcon range states across Africa and Eurasia, including many which are undergoing dramatic social change. They vary between some of the richest in the world and others that are poor and under-developed. To the people in these nations, the Saker Falcon can be considered a valuable natural asset which, if allowed to utilize sustainably, should encourage them to conserve it.

In February 2015, an opportunity arose to present the concept of an Online Saker Portal project to the IUCN Conference – "Beyond Enforcement". We could convey that this project offered a powerful and possibly unprecedented model for addressing illegal transnational trade of an iconic and high value species. In developing the Portal, we have engaged falconers in a number of countries, including contributing to the translations. The Portal has demonstrably attracted attention from a wide spectrum of people in different countries and language groups. Its success has exceeded our expectations and provides a solid platform to build upon. The Portal offers a unique mechanism to monitor trade but also to change attitudes and practices to promote sustainable use. New features and novel ideas are planned to draw more visitors to the site and to stimulate engagement. One such feature could be real-time tracking of satellite-tagged Saker Falcons, perhaps coupled with a new competition to enhance interest.

The Saker Falcon Task Force, supported by the Coordinating Unit of the CMS Raptors MoU, has brought together government officials from range states with the Sustainable Use Groups of IUCN, falconers, ornithologists and other interested parties. It has fully integrated falconers into the hunt for a solution to the plight of this species. Furthermore, it has opened dialogues between practitioners and authorities in nations such as Afghanistan, Iran, Kazakhstan, Kyrgyzstan, Mongolia, and Pakistan, among others. The Portal is the first Flagship Project to emerge from the Task Force. In time we hope that it can be used to develop and monitor sustainable, legal and regulated trade in this species which will benefit local people in the breeding and passaging areas, the end-users, and the Saker Falcon itself.

Adrian Lombard and Nick P. Williams, Co-Chairs of the Saker Portal Project Steering Group

II. Executive summary

1. A portal system for creating a network of falconers and trappers across was built on schedule in Arabic, Farsi, Pashto and Russian as well as English in a back-office at www.saker-staging.net.

2. The system went live in April 2015 at www.sakernet.org and attracted 2000 visitors in 9 months, twice the target; 32% of visits were in English, 31% Russian, 23% Farsi and 12% Arabic; however, most Russian visits were short duration and probably mainly not by practitioners.

3. A survey of falconers and trappers, which went live in May 2015, had 18 of 67 completed responses from Pakistan, a similar number from Central+ Northern Asia, and 4-5 each from North Africa, Iran, India and China. Earlier survey gave 37 Saudi and 10 Emirati responses.

4. The ratio of website visits to completed surveys was high in Saker breeding areas of Central Asia and China, with a ratio approaching 1:1 also in Pakistan; in these areas and Iran, falconers were most trapping and releasing their own Sakers.

5. Many Saudi falconers kept Sakers but fewer trapped them than in more northern areas; like these areas, Saudis kept fewer hybrids than in the Emirates, where fewer falconers had Sakers; in these Arabian Peninsula countries falconers were older than elsewhere.

6. In North Africa, where trapping and keeping Sakers was also popular, and in North Asia where Sakers were much less flown, Saker numbers were deemed to be increasing, unlike elsewhere; in the Peninsula, Iran and Asia, 50-100% of falconers visited falcon clinics.

7. Staff from 9 veterinary establishments were interviewed; all were marking clients' falcons, in 7 cases with AVID microchips to record re-visits; 6 were prepared to provide small feathers for DNA-banking to confirm ownership securely.

8. The 8 public clinics would cooperate with a scheme to monitor wild populations and trade through mark-recapture methods and would welcome an internet system to facilitate this.

9. All veterinarians were interested to know country of origin of birds marked in nests, and to access records through reading chips if not doing so already; a system to distinguish pure species from hybrids was also sought by some clinics and internet presence by others.

10. The project's year-two aims to increase survey samples from countries with few responses, especially where trust is felt to be low, and extension of veterinary survey to all clinics; the science and administration portal needs more work when an STF coordinator is appointed.

11. In order to start monitoring populations and give confidence that trade can be sustainable, it is recommended that tests of a simple liaison system for veterinarians should lead to countries funding (a) delivery of their falcon-clinic internet requirements in exchange for provision of marking data, and (b) a start to marking more young in breeding areas.

III. Background

The Saker Falcon (*Falcon cherrug*) is the world's second largest falcon, with breeding populations distributed across the breadth of Eurasia, with some migration to Africa for winter. Falcons have for many centuries been trapped sustainably for use in falconry, typically while on autumn migration and with subsequent release of trained birds back to the wild in springtime at the end of the hunting season.

Breeding is mainly in steppe and semi-arid land, on cliffs in the south and in trees in northern areas, with some also on man-made structures and in artificial nests. In parts of its range with limited nesting opportunities and recent increased access for trappers, trapping of breeding adults has been associated with population declines. Healthy populations still occur in other parts of its range although there are major concerns about electrocution on poorly designed power poles (Dixon 2016) and secondary poisoning during control of rodent populations may be another important threat (Fox et al. 2003). As a result of these factors, as well as large scale anthropogenic changes in land use, Saker populations declined globally, leading to Red Listing of the species as threatened, and growing pressure for action through the Convention on the Conservation of Migratory Species of Wild Animals (CMS 1979) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973).

CMS Resolution 10.28, adopted at the 10th Conference of the Parties (COP10) in November 2011, placed the species on Appendix I, and therefore outside scope of trade. However, an exception was made for Mongolia, where the wild population was being enhanced by production of up to 2,500 young Sakers annually from artificial nests in areas lacking natural nest sites (Dixon et al. 2011, 2016). Resolution 10.28 also established a Saker Falcon Task Force (STF), bringing together Range States, Co-operating Partners and other interested parties to develop a coordinated Global Action Plan, including a management and monitoring system to conserve the species.

STF Working Groups were established in 2012 to help draft the Saker Falcon Global Action Plan (SakerGAP). As the issue of sustainable use of Sakers, primarily for falconry, was considered to be a central element to their future conservation and management, a contract was placed with European Sustainable Use Group to review Saker population modelling and collect data on use of the species in falconry. Models with best estimates of productivity and survival (tested against observed Saker population growth in Hungary), predicted resilience to harvest for European and Asian Saker populations above 80 pairs (Kenward et al. 2013). The report also noted potential for using recapture of falcons marked in breeding areas to estimate population sizes as well as harvests, and that liaison with falcon hospitals during the 1990s had been important for testing this mark-recapture approach.

A first draft of the SakerGAP was reviewed at a Stakeholders' Workshop in Abu Dhabi in September 2013. The workshop also recommended projects with satellite tracking of a hundred Sakers, a restocking programme with a thousand nest boxes and work to make a million power poles safe for raptors. However, noting recent survey findings that falconers and trappers in the Gulf States remain consistent visitors at falcon-hospitals, the first STF Flagship Project was to develop a portal in Arabic, Farsi, Pashto and Russian to engage with biologists and other markers of falcons at nests, trappers, falconers, and some ten falcon hospitals.

This SakerGAP was adopted by the 11th Conference of the Parties (COP11) in November 2014 through CMS Resolution 11.18. In the meantime, other practitioner-funded work in Mongolia had indicated that severe problems with electrocution on medium voltage transmission lines (Dixon et al. 2013), which were being widely constructed as new infrastructure across Central Asia, was probably the main threat to the species. An offer by International Association for Falconry and Conservation of Birds of Prey to take forward the first Flagship Project was welcomed in Resolution 11.18.

IV. Introduction to the project

The population dynamics required for ecological sustainability of Saker Falcons, including a proposed harvest level of 5% from healthy populations, are well defined in the SakerGAP (Kovács et al. 2014). However, the World Summit on Sustainable Development in 2002 noted that sustainability needs to be social and economic as well as ecological (WSSD 2002). The principles for sustainable use of Sakers that are also socially and economically practical are by no means well defined, and that too affects harvests. If falconers are to be part of the solution for conserving Sakers through sustainable use, how would they like to engage and contribute, and through what form of governance?

The underpinning governance is especially challenging. Conservation has been largely based on stopping people doing damage through protective measures, a coercive "don't" approach. For practitioners to assist monitoring and restoring species and habitats, a persuasive "do" approach is needed, with carrots instead of sticks. Unfortunately, although western-dominated conservation interests who operate mainly in the English language have created restrictions on use of Sakers in some countries, the need for conservation actions have not been explained widely by trusted sources to local people in their own languages. A further complication for work through CMS is that a number of Saker Range States with appreciable practise of falconry are not signatories to CMS, including Bahrain, China, Kuwait, Russia, Qatar, Turkey, Turkmenistan and UAE.

The rationale behind this project was that, with high penetration of the internet in Arab and ex-Soviet states, and of smart-phones more generally, online portals run by trusted sources could be the best way to win support of falconers and trappers. The advantage of the offer by the International Association for Falconry and Conservation of Birds of Prey (IAF) to spearhead such a portal is that, with member clubs in 80 countries (including China, Russia, Qatar, Turkey, Turkmenistan and UAE), IAF has better organised links into appropriate countries than any organisation focused on sustainable use of wild resources.

The ultimate target of the project is the creation of a vibrant network of committed enthusiasts to share knowledge and to attract funding to conserve the Saker Falcon. If traditional falconry is to thrive, based on sustainable use of falcons and prey which depend on vulnerable grassland ecosystems, it is essential that falconers become organised to help (i) collect data needed to ensure sustainable harvests, (ii) reduce poisoning and electrocution, (iii) halt trapping of breeding adult Sakers and (iv) restock depleted Saker populations. To this end, the objectives for the first two years of the project were:
- to construct an internet portal, in at least 4 languages, through which falconers and other conservation interests can engage with some 10 falcon clinics; and
- to attract the interest of as many falconers and falcon trappers as possible throughout the Saker Falcon Range States by means of a "Smartphones for Saker Conservation" survey.

The portal system is being designed for long-term use by regional clubs of IAF and by falconry clinics after the set-up work is completed during 2015-16. The Phase I targets included engagement of all existing falcon hospitals, and obtaining an ambitious 1000 visits to the portal by falconers and trappers.

At the start of the project, it was thought that networking for steps (i) to (iv) might alone be adequate to restore Sakers to a satisfactory conservation status. Otherwise, there would be scope for a Phase II of the portal system to host an adaptive management system through which:
- registration of Saker Falcons marked by biologists at nests;
- reporting of falcons when trapped, and
- registration at hospitals of falcons in training,
could be used to estimate harvests, assess population sizes and encourage only that trade which is legal and sustainable.

V. Main approaches and technology

An early title for this project was "Portals for Enhancing Trust" for Sakers. This harks back to an IUCN Resolution of 2008, on "Trust building for biodiversity conservation and sustainable use". It is interesting to note that IAF's first major international engagement with Saker issues was a Resolution in 2000 (IUCN 2000) that called for development of "an internationally recognized system, initially for this species but applicable for other wildlife, that combines wildlife research and modern marking technologies to: (a) monitor populations and estimate sustainable yields; (b) regulate procurement and international movements with minimal administrative costs; and (c) motivate conservation of the species and its habitats throughout its range".

The first intention of this project is in effect to build trust with falconers, trappers and falcon clinics across several Asian cultures through use an internet portal system. This requires initially to engage their interest, and then to help these practitioners in various ways. Only when trust is established can one attempt also to guide and encourage conservation. In order to reach thousands of falconers across many cultures, some of which are currently in conflict, the approach has been to build a portal that gives helpful information on a number of issues from a trusted source, the IAF, in four widely used languages. Trappers and falconers are being attracted to the system partly by multilingual information on Sakers in the wild (e.g. explaining why trapping breeding adults is unwise), about restocking work and movements of satellite tracked falcons (with scope to sponsor these), and with tips on care of trapped and trained falcons (including encouragement to visit falcon hospitals).

In order to further attract interest to the portal, IAF developed a survey with prizes for participants. Like the multilingual site for practitioners, the survey was designed for use on smart-phones as well as laptop and desktop computers. Falconers and trappers in some Saker range states have suffered loss of infrastructure at home due to conflicts, but would have phones to keep in touch with their families. Prizes were included as they have become popular at falconry competitions on the Arabian Peninsula. As well as trust-building, motivations for engagement in conservation are important.

Help from falcon hospitals with recording falcons marked in the wild was very important during studies in the 1990s (e.g. Riddle & Remple 1994, Fox et al. 1997, Kenward et al. 2001, 2007) and is sought again by discussing what the system could do to help them. The hospitals vary greatly in size: some are extensive buildings in prestigious locations, and others are specialist clinics in locations more easily reached by local falconers on foot. A more personal approach has worked for falcon hospitals and clinics, by going to talk with the veterinarians or meeting them at professional gatherings.

Although the main actors to be engaged are trappers, falconers and falcon hospitals, it has also been important for the future to provide information also for potential markers of nestlings. Markers will be local people trained to attach rings and microchips to nestling falcons, as a mark-recapture process to estimate sizes of falcon populations and harvest rates from them. Although marking needs eventually to engage local land managers, and hence encourage them to conserve habitats, initial markers are likely to be biologists. To build trust and inform biologists, the English language version of the portals also makes clear the involvement of BirdLife International, IUCN and UNEP-CMS.

V.1   Web sites

The portal consists of a multilingual site (www.sakernet.org) for practitioners (Fig. 1, **red**) linked to a survey module (**purple**) and to another System for Community Liaison (**green**), which can produce a network of individual sites in different languages (but currently only runs one in English for science and administration at www.sakerfalcon.org). The model for the practitioner site is a portal built in 2011 to

provide information on conserving through sustainable use and conduct survey across different European cultures, by Anatrack Ltd and the (then) European Sustainable Use Specialist Group of IUCN, for a project funded by European Commission to design a Transactional Environmental Support System (see www.naturalliance.eu). The basis is a back-office in English which can be accessed for editing and translation through www.saker-staging.net). Unlike the initial site, the Saker version is smart-phone-friendly, works well with right-to-left languages, and can have both diagrams and links which are language specific. Thus the legends and labels for diagrams reflect a different image stored for each language, and the links (where appropriate) go to the site or download concerned in the language being used at the time.

Figure 1 Portal based on use a multilingual Saker template (**red**), linked to a multilingual survey module (**purple**) and SYCL sites (**green**) in each language, from www.anatrack.com.
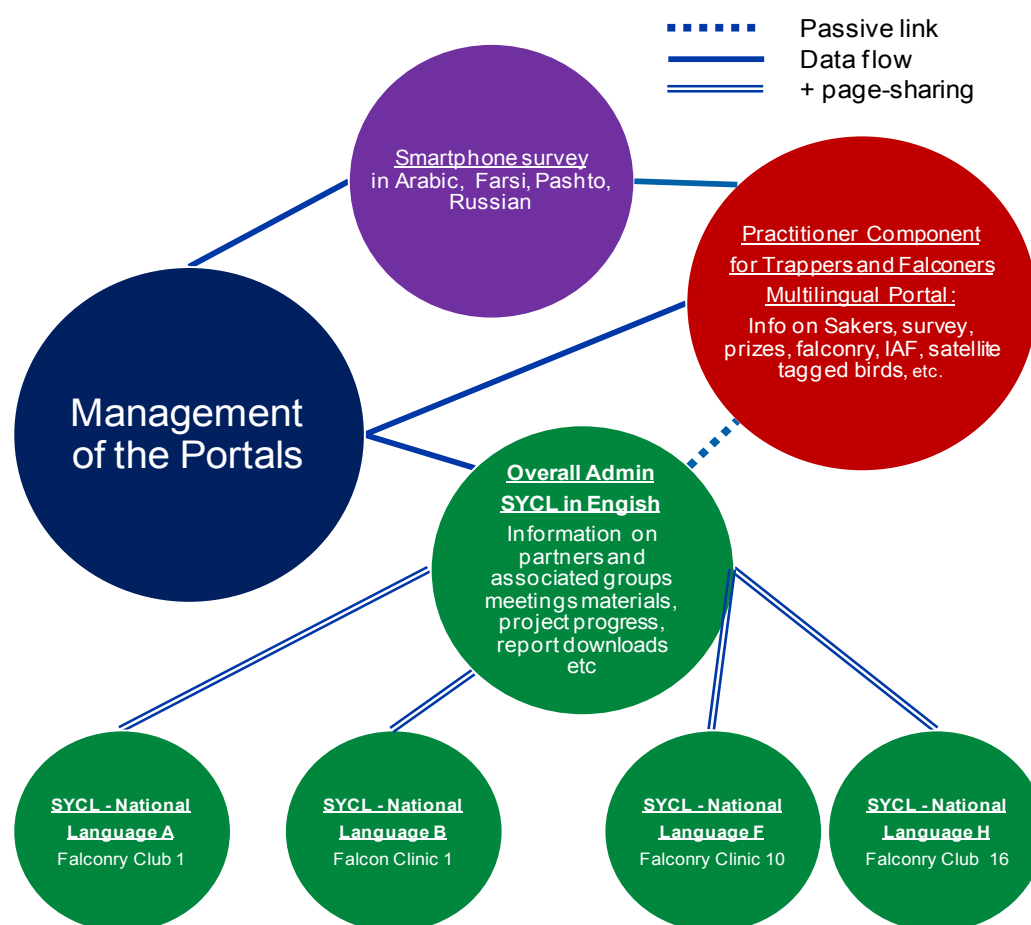
The Practitioner template's Back-office (**red**) can:
  (i)   load language-specific text, images and links into topic pages with subpages (e.g. figures can be regularly updated to show survey results without changing text);
  (ii) translate all content into other languages (including for right-to-left script);
  (iii) accommodate language-specific links for monitoring and survey routines, reports, videos etc;
  (iv) deliver downloads, including a multilingual mapping tool.
Users can:
  (i)   switch between cultures (country/language combinations);
  (ii) read, download and link-out to further information and survey in the different cultures;
  (iii) register to be alerted about updates, engage in projects work, etc;
  (iv) make contact to offer information or donations.

The SYCL template used for www.sakerfalcon.org is more flexible, enabling local editors to create content across a choice of page types suitable for (i) basic information including links (ii) news items and calendar, (iii) document storage, (iv) mapping, (v) links to listed services, (vi) photo-galleries and (vii) registering and contacting visitors. The template enables separate sites, each with all these facilities for sophisticated local content (through an HTML translation capability), and survey only through linking out. See Figure 1 in **green**. However, although the sites and their instructions can be in any language (with left-to-right text composed in the back-office and right-to-left text pasted in after formatting elsewhere), they lack the ability to switch content between languages on each site.

As indicated in Figure 1 in **green**, these sites can be used to manage:

   A. In English, a project as a whole, including pages provided to national sites.
   B. In national languages, for different activities within a country by falconry clubs and clinics.

In the national language, the national sites can also network and insert pages into sites run by clusters of local individuals or organisations.

V.2   Web survey

The survey was based on a simplified version of a questionnaire developed for falconers and trappers by Monif AlRashidi in the 2013 survey for the SakerGAP (Kenward et al. 2013), following a yet more extensive previous survey (AlRashidi 2004). The questions (Table 1) were ones considered likely, on the basis of the previous surveys, to be easily answered without fear of admitting to any dubious activities. The aim was to build trust, not to make practitioners afraid to respond.

Table 1 List of questions and possible responses in the survey in Arabic, Farsi, Pashto and Russian.

Question	Possible responses
Did you answer our questionnaire before?	Yes/No
In what country do you live?	*List of countries*
Do you have knowledge of wild Sakers in other countries?	*List of countries*
Do you consider that wild Saker numbers which you observe are decreasing or increasing?	Decrease/Increase/Stable/Hard to say/No opinion.
Would you like to help wild Saker numbers remain strong for future trapping?	Yes/No/Not sure
Are you a falconer?	Yes/No
About how many new wild Sakers have you obtained in the last 5 years?	*Scale of values*
How many other new wild falcons have you obtained in the last 5 years?	*Scale of values*
How many new hybrid falcons have you obtained in the last 5 years?	*Scale of values*
How long have you been a falconer?	1-5 y/6-10 y/11-20/>20y
Do you take all your birds to falcon hospitals?	Yes/Only some/Only if sick/No
Do you trap falcons for yourself?	Yes, all/Yes, some/No
Do you release your Sakers or other wild falcons after the hunting season?	Yes, all/Yes, some/No
Are you a trapper?	Yes/No
About how many Sakers have you trapped in the last 5 years?	*Scale of values*
About how many large Sakers - Kamel (female) have you trapped and **kept** in the last 5 years?	*Scale of values*
About how many small Sakers - Mathlotheh (male) have you trapped and **kept** in the last 5 years?	*Scale of values*
About how many adult Sakers – (Algranis) have you trapped and **kept** in the last 5 years?	*Scale of values*
In how many countries do you trap falcons?	*Number*

V.3   Survey of falcon veterinarians

As there are relatively few falcon clinics and their engagement is so important, each is receiving an individual invitation to participate, with an explanation of the importance of the project both for conservation and for the long-term future of falconry - the passion of their clients. They are being asked to provide basic data on their clinic in Table 2, and information In Table 3 on numbers of falcons handled annually and what IT help they would appreciate in exchange for cooperation with the project.

Table 2 Registration data for falcon hospitals.

Date:		
Country:		
Falcon Hospital:		
Period of operation:	Opening year:	Closing year:
Address:		
Phone:		
E-mail:		
Web:		
Data provider		
Name (title & first & family):		
Affiliation:		
Position:		
Address:		
Phone:		
E-mail:		

Table 3 Induction survey for falcon hospitals.

Roughly how many of your clients keep pure Saker Falcons?	
Approximately what % of Saker Falcons are individually marked when first presented at the Hospital?	
Do you mark any or all previously unmarked falcons during treatment If yes, what method(s) is used?	
Do you record re-visits of each marked Saker Falcon?	
What equipment manufacturer(s) do you use for reading the identity markers (e.g. microchips)?	
Would you be interested for the CMS Saker Falcon Task Force to infor you of the origin of falcons with pre-existing identity codes?	
What other help could the Flagship Project provide for you to reward your assistance with the project, for example as information / increased internet presence of your hospital?	
Would you be willing, if clients agreed, to collaborate with the Project by providing a body feather sample from trapped Saker Falcons for DNA extraction, as a long term project to identify populations from which they originated?	

VI. Findings in year 1

The planning aims of the project were to have the portal translated and live in four months, and the survey live in five. After the project started on 1 December 2014, both targets were met. The practitioner component and the administrative SYCL site were ready for testing by April and were launched at a meeting if IAF in Brussels on 20 April 2015, about a month before the survey went live.

VI.1   Web sites

The contents of the practitioner site had to be planned before delivery of the template, which was scheduled for January 2015, because development time was saved by requiring some topics to be hard-coded. Preliminary discussions with IAF in September 2015 resulted in agreement for the practitioner portal to have the following sections (as well as the standard "Home" page and pages for "Terms and Conditions", "Privacy Policy" and "Contact Us"):
1.   Displaying smart-phone survey results, provided by JS, and prize winners;
2.   Information topic on Saker Falcons in the wild, trapped and trained;
3.   Information topic on handling and veterinary care of Saker Falcons;
4.   Information topic on falconry more generally and the IAF;
5.   Registration of contact details for direct provision of information;
6.   Acceptance of sponsorship payments for projects such as satellite tracking;
7.   Maps of satellite-tracked falcons (display small, expand on click);
8.   An English section accessible only via the administration section of the portal.
For brevity on buttons, the topics at launch were "Wild Sakers", "Migration", Healthy Sakers", "Trained Sakers", "Falconry" and "Survey Results", plus a page for Falcon Hospitals

A "Content Committee" was established in early January 2015, consisting of Andrew Dixon (AD), Bakyt Karnakbayev (BK), Gary Timbrell (GT), Kamran Khan Yousafzai (KKY), Margit Muller (MM), Matyas Prommer (MP), Mohammad Kathlan (MK), Mohammed Shobrak (MS), Monif Al Rashidi (MAR), Reza Parastar Namini (RPN) and Zayed Al-Maadheed (ZAM), with chairs of Steering Group, Adrian Lombard (AL) and Nick P. Williams (NPW) and organisation by Janusz Sielicki (JS) and Robert Kenward (RK). During the following 3 months, they kindly corrected and approved drafts of practitioner site content from RK & MM, and of the survey from JS, and agreed domain names for the sites. Images for the practitioner site were kindly provided by AD, JS, MM, RPN, AL and RK, with texts for the administration site from Ian Burfield, JS & RK. Heroic efforts from MAR (Arabic), RPN (Farsi), Pashto (KKY) and Russian (JS) gave translation for the practitioner section within a month.

The target of obtaining 1000 visits to the portal by falconers and trappers was reached after just 4 months, and there had been 2000 visits by the end of January 2016. The most visitors to the site, 734, were from Russia (31% of the total), but a very high "bounce rate" indicates that many were not attracted by ornithological interest in the site. Therefore Iran, with 532 visits (23%) had more pages viewed per visitor (1.9) than for Russia (1.1). The third highest interest was from states speaking Arabic in Asia (including the Arabian Peninsula): 292 visits and 1.7 page views each which was similar for 75 visits from North Africa (2.3) and 93 from ex-Soviet states (1.9). Europeans were the fourth most frequent visitors (268), with 3.5 pages viewed on each visit, similar to the interest shown by 50 visitors from Pakistan and Afganistan (2.9) and just 4 visitors from China (3.5).

VI.2   Web survey

During the first 3 months of operation (until the Muslim new year of Eid al Adha in September), those completing the survey and leaving their email address were entered into a raffle for prizes valued at

about US$250 each (the first prize was a smart phone and the other three were falconry equipment). The 54 people who completed the survey could be compared across global regions with visitors to the web-site, and with numbers who had started the survey but failed to complete it. The completion of the survey was considered to indicate a greater degree of trust in the survey organisation than starting and failing to complete.

By the first three months of the survey, when the competition closed, there had been 507 visitors to the web-site, broadly showing the same pattern as in January 2016. Thus, the most prominent visitors were generally in the Russian language, from Russia and other northern states (e.g. Ukraine, Moldova), with visitors in Farsi from Iran the second most prevalent, followed by those in Arabic from the Arabian Peninsula and nearby states (Fig. 2, blue). In these three cases there were higher proportions visiting the site than starting or completing the survey (only about half started the survey).

Interestingly, the strongest tendency to start and complete the survey, among visitors in Pashto (almost entirely from Pakistan), from other parts of ex-Soviet central Asia, and from China, was associated also with a high number of page views on the web-site. However, this applied only to areas where falconers and trappers contributed to the survey, as there were no survey starts despite high page-reading interest from Europe. This probably reflected minimal ownership of wild Sakers in Europe; relatively high interest in the web-site in Russia and Iran may have reflected activity of automated web-assessment systems rather than falconers or trappers in those countries. There were many more visitors than survey-starts from Saudi Arabia, UAE, Qatar and other states on or near the Arabian peninsula, and this region had the strongest tendency not to complete the survey.

Figure 2   The proportion of visitors to the web site on Sakers for practitioners, to the survey site, and who completed the survey from various global regions within 3 months of system launch.
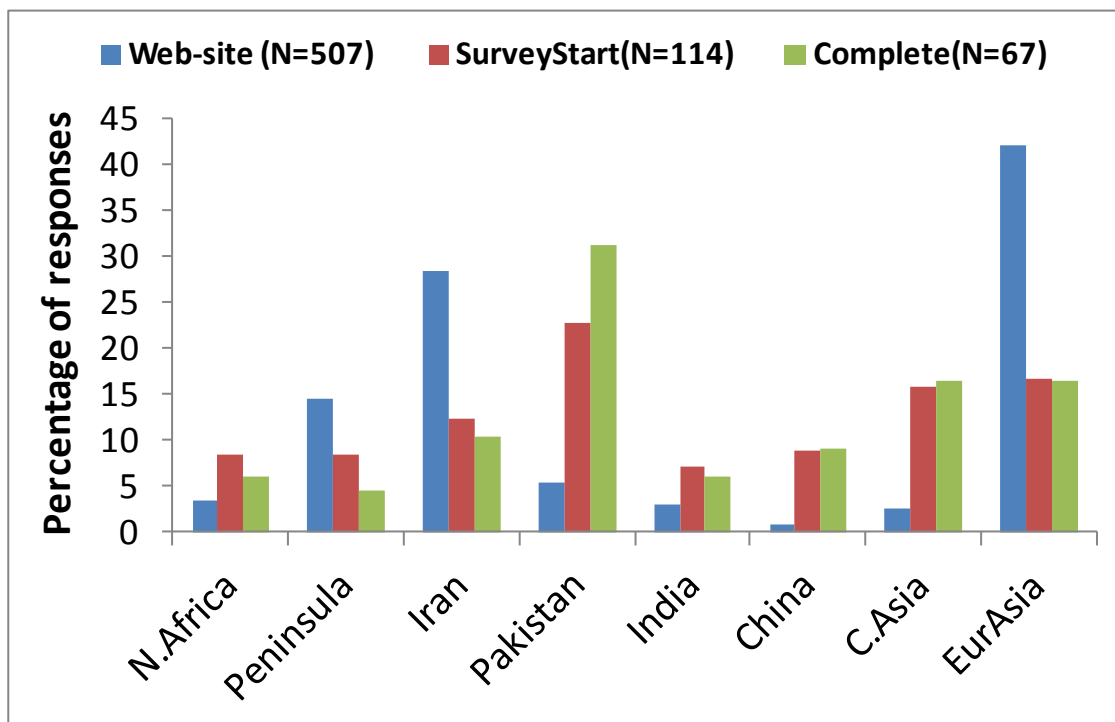
The contributors from China and India were impressive because they completed the survey in English, as did some participants from Central Asia. For all these three areas more people started the survey than visited the web-site, with only one more web-site visit than survey start in Pakistan (where about half the visitors used English rather than Pashto). This may have reflected the leaflets promoting the survey,

which were circulated by falconry clubs, giving an internet address from which the survey could be completed in English, whereas the link to the web-site was not for use in English.

Ten or more survey returns were obtained from North Asia and Pakistan. However, the 2013 survey gave additional data from Saudi Arabia and UAE for most questions that were also asked in the internet survey. Thus there were at least 10 responses from 4 regions, justifying some comparison between their responses (Table 4, for rows shown green), although samples of at least 20 would be preferable for making comparison between regions (Table 5).

Table 4 Completed responses for the first three months of internet survey (samples of ≥10 in green).

| | No. of survey returns | Saker 'increase'-'decrease' as % of N | % of repondents in each country or region who: | | | | | |
			keep Sakers	keep hybrid	falconers for <10 years	use falcon clinics	trap own Sakers	release trained Sakers
North Africa	4	+25	100	75	25	25	75	50
Saudi Arabia	37		70	15	14	100	17	50
UAE	10	-33	30	90	20	67	22	100
Iran	5	-100	100	40	80	80	100	100
Pakistan	18	-50	83	44	72	28	67	83
India	4	-25	0	0	25	50	75	100
China	4	-75	100	0	50	0	25	100
Central Asia	8	-25	88	0	50	50	50	88
North Asia	10	+10	30	50	40	70	20	50

    regions with tolerable responses; >20 is an adequate sample

Table 5 Completed responses for the internet survey, with strongest effects in green or orange.

| | No. of survey returns | Saker 'increase'-'decrease' as % of N | % of repondents in each country or region who: | | | | | |
			keep Sakers	keep hybrid	falconers for <10 years	use falcon clinics	trap own Sakers	release trained Sakers
North Africa	4	+25	100	75	25	25	75	50
Saudi Arabia	37		70	15	14	100	17	50
UAE	10	-33	30	90	20	67	22	100
Iran	5	-100	100	40	80	80	100	100
Pakistan	18	-50	83	44	72	28	67	83
India	4	-25	0	0	25	50	75	100
China	4	-75	100	0	50	0	25	100
Central Asia	8	-25	88	0	50	50	50	88
North Asia	10	+10	30	50	40	70	20	50

    within notably high 20% (tolerable sample)
    within notably low 20% (tolerable sample)

    within notably high 20% (inadeqate sample)
    within notably low 20% (inadequate sample)

The relatively small number of responses from five regions reduces confidence in data from those sources. Nevertheless, the unanimity of responses that suggest Saker population decline in Iran contrasts with a slight preponderance that considered numbers to be increasing in North Africa (although detection of the slow build up of birds winter from increasing populations in Europe seems

unlikely) and North Asia. The respondents mostly kept Sakers, which is to be expected in a survey that targeted information on Sakers, but it was notable that only three of ten respondents were keeping them in North Asia and UAE, with none kept in India (where raptors are kept but may not be used legally for hunting). The proportion of respondents keeping hybrids was high in UAE, low in Saudi Arabia and zero in India, China and Central Asia, but appreciable in other countries.

There was considerable variation in the age structure of the falconry community that responded. A majority of respondents had been falconers for less than a decade in Iran and Pakistan, whereas in the Peninsula countries of Saudi Arabia and UAE more than 80% had practised falconry for longer. Further information on the situation in Saudi Arabia is also shown for the 2013 survey in Table 6, where it can be seen that falconers averaged 49 years old and 54% had practised for more than 20 years. Sakers were the strongly preferred species, with only eight of the 27 active falconers not having Sakers (the other ten had stopped flying falcons due to lack of quarry), and they exchanged hands at an average price of US$8,000 (range US$2,000-19,000).

Table 6   Attributes, experiences and value placed on Saker Falcons for 37 falconers and falconer/trappers surveyed in Saudi Arabia in the 2013 survey

	Region	Age	Why do you practice the sport of falconry?	How many years have you practiced the sport of falconry?	How many falcons do you have now?	And from which species are they?	If none, why?
Mean/ reply % Median/ majority	78% Hail	48.8 49.0	100% Hobby	29% 10-20 years 54% more than 20 years	2.3 2.0	52% of 61 are Saker 8% are hybrid	27% (10) not active Shortage of quarry (Houbara, Stone Curlew and Arabian Hare)

How do you mark your falcon?	In the last 10 years, how many wild falcon have you had with CITES?	What is the longest period which a falcon has stayed with you?	From which species is it?	What happened to it?	Sort falcon species according to your preference	How many Saudi Riyals do you expect to pay for a wild Saker now?	How many falcons have you trapped (captured) by yourself in the last 10 years?
100% marked 96% ring +micro- chip	100% reply 10% had CITES	5.3 years 4.0 years	100% reply 91% Saker	16% died 66% sold	100% reply 91% Saker first choice	US$8313 US$7500	17% of falconers also trap Saker was 38/100 falcons trapped

All the Saudi respondents visited veterinarians and 96% had their falcons marked with micro-transponders. Good veterinary care resulted in trained Sakers leaving the hands of owners mainly due to sale or release, with only 16% through death. In other regions, the new survey (Table 5) showed that falcon hospitals and clinics were used by a majority of respondents in Iran, North Asia and UAE, but less frequently elsewhere and not by respondents in China.

The proportion of falconers who also trapped falcons in Saudi Arabia was only 18%. The seven concerned had each trapped 2-60 falcons in the last decade, 100 altogether. However, the 38 Sakers trapped would have just about sufficed for all 27 falconers in the survey in the previous decade, because the average possession was one Saker at a time for 2-3 years after which 66% of them were sold on. On that basis, the 20-100% of respondents who were trapping falcons in other countries (Table 5) could have been meeting most of the local regional demand. This suggests that widespread, small scale trapping by other falconers, rather than intensive by few people, may have been meeting the demands of the respondents to this survey. Apart from North Africa, North Eurasia and Saudi Arabia, most respondents also reported releasing Sakers back to the wild after their use in falconry (Table 5).

During the verbal survey in 2013, falconers in Saudi Arabia and the United Arab Emirates proved well aware of conservation issues, including pressure on wild stocks, and favoured solutions which included better care and information through falcon hospitals and clubs. Certification too was acceptable, but other regulation was less favoured and there was no willingness to pay extra for certificates of legal origin. Initial suspicion of the survey team was overcome in discussion that showed strong links to international falconry: trust-building was important for cooperation.

It is important to note that capture and flying of wild Sakers within a country is not subject to CITES restrictions on international trade, and has remained legal in Saudi Arabia and some other countries. However, breaches of CITES occur when such birds are taken across land borders between neighbouring states, where with families and friends often living across borders which are not tightly controlled, this can become a routine practice. It was explained more than once during the internet survey that although many falconers on the Arabian Peninsula had visited the web-site and some started the survey, reluctance to provide possibly compromising information had deterred completion and had also deterred others from engagement. Wider use of a falconry-passport system could help in this context.

On the other hand, it became apparent during these surveys of falconers, and in the survey of falcon veterinarians described next, that falconers were quite prepared to have their birds marked by veterinarians with micro-transponders. Such marking was originally a convenience for vets to assign medical histories to birds which quite frequently change owners, but has become a requirement in some countries at least for participation in competitions. In combination with the banking of genetic material from each bird (e.g. as a small feather) to detect any transfer of markers, there is scope for monitoring trade through comprehensive marking. Moreover, for monitoring trade from point of capture, it was useful that 5 of 7 Saudi trappers would have been be prepared to mark trapped falcons prior to sale, albeit with some reluctance because this risked raising suspicions about lack of wild origin.

Prizes for the survey were distributed in December 2016. The first prize (of a Motorola smartphone but taken as US$250 cash), was won in Pakistan, an appropriate reflection of the good survey response there. The prizes of falconry equipment went to falconers in the United Arab Emirates, Pakistan again and Turkmenistan.

VI.3   Survey of falcon hospitals

Data on 9 falcon hospitals or clinics were obtained by personal interview between 7 and 11 September 2015. Four establishments were visited in Doha, Qatar, one of them a large establishment created in

2011 with government support, and three somewhat smaller and longer established. All had been contacted in advance, and all readily made time for the survey interview. Veterinarians from five other establishments came to the IAF stand at ADIHEX, held in Abu Dhabi in September 2015. Two came by arrangement from falcon hospitals in UAE, and two also from smaller clinics, in one case providing services only for one private client. One veterinarian, with personal experience as a falconer for 25 years, came from Iran.

The large falcon hospitals were handling 6,500-11,500 birds per annum. The smaller establishments were handling 35-100 falcons, although one large clinic apparently saw about 3,000 birds annually. All but two were marking birds with micro-transponders, the exceptions being the clinic in Iran and the private clinic in UAE, which was seeing only domestic-bred falcons with close-rings (Fig. 3). The AVID micro-transponder brand was in use at all the other seven sites; as AVID was used in UAE in the 1990s, it had been encouraged as a standard for the work with wild birds at that time (Kenward et al. 2001). However, two establishments in Dubai were also using a smaller transponder type from Australia.

Figure 3 The number (totalling 9) of falcon veterinary establishments using markers on birds, ready to provide a small feather for DNA and welcoming a system giving information on already-marked falcons.
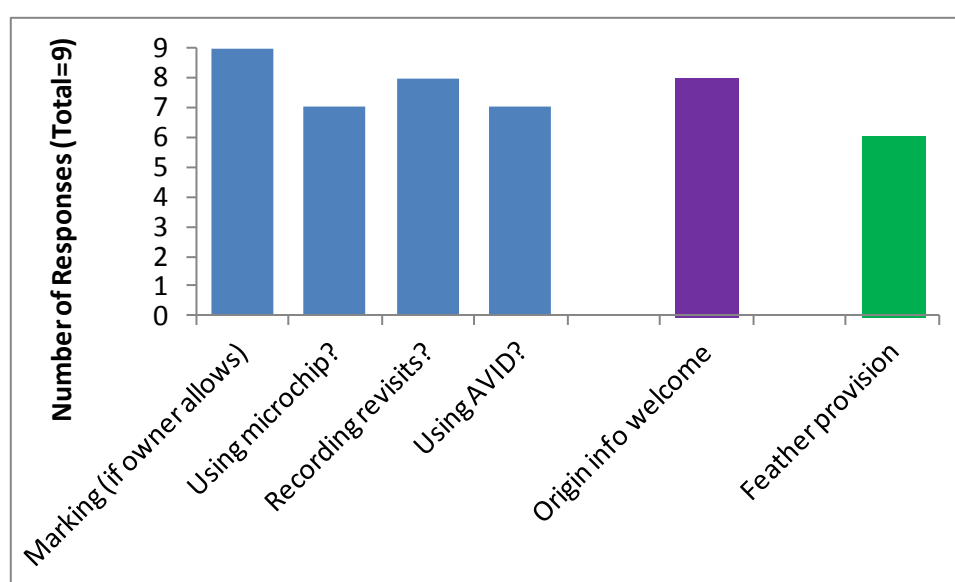
There was one marked difference in data between the public veterinary establishments in UAE on one hand, and in Qatar and Iran on the other. In the three public UAE establishments, less than 5% of the falcons being seen were believed to be pure Sakers, although the private collection of domestic-bred falcons was reported to be 70% pure Saker. In contrast, 30-60% of the falcons seen in Qatar and Iran were Sakers, although one team in Qatar noted that a number of these were likely to be hybrids.

The recognition of hybrids was a particular concern at the largest falcon hospital in Qatar, because the rules for the very popular falcon races required certification of birds as pure stock. As a consequence, the new technology most favoured for the hospital was deemed to be a recognition process for hybrids, such as a test for presence of genes from other species in Sakers. Subsequent to that final interview in Qatar, three of the establishments in the UAE agreed that such a test would be useful. Five of the nine establishments considered that they would benefit from a system to call up medical records when a micro-transponder was read, and two of the hospitals had such systems already. Three establishments would have welcomed help setting up a presence on the internet.

One dominating interest, in every single establishment except the private clinic with domestic-bred

birds, was for the project to provide them, if possible, with a system to indicate the country of origin of any bird that had been marked in the wild (Fig. 3). Six of the nine establishments said they were prepared to supply a feather for banking when they marking birds, if such a system was organised; the other three would require further discussion on the topic.

One further comment which arose in discussions both with falcon hospitals and with clubs seems very important. There was a realisation that questions about ownership of wild Sakers, including pure Sakers that were likely to have wild origin (as few were being bred), was a delicate issue in view of the CMS Appendix I listing of the species for all states except Mongolia. On the one hand it was felt that knowledge of the proportion of 'pure Sakers' being registered at hospitals could be embarrassing for governments, especially if they were CMS and CITES[1] signatories in states where few wild Sakers were trapped. On the other hand, it was felt that a low response of falconers to the survey was also to be expected in countries where many trained Sakers had come from the wild, because the survey required respondents to give names if they wished to enter for prizes. Where the prizes for falcon races could include high value vehicles, there was less motivation to enter for US$250 prizes than in less wealthy countries.

VII. Conclusions from the findings

The multilingual web-site and survey was delivered on time. A visitor target was set for the site based on findings with multilingual www.naturalliance.eu, but conservatively in view of lower internet connectivity in many Saker range states than in Europe. This target was met comfortably, with visitors throughout and beyond the Saker geographic range. The presence of falconry clubs linked to IAF in so many of the countries probably contributed to this, especially for countries where numbers of surveys were close to numbers of site visits. The value of community-run multilingual communication is clear.

Targets were not set for the multilingual survey in unknown social terrain. Coverage was wide and samples best from areas that had not previously been surveyed. However, the relatively short duration of the survey before prizes were drawn may have reduced samples, so there is need to run the survey again in the second year. Nevertheless three facts have become very clear.

One is that traditional trapping, training and release of Sakers by local falconers remains widespread, and many are prepared to give information via the internet at least when there are prizes involved. That was similar to finding for ordinary falconers who kept relatively small numbers of hawks in Saudi Arabia, when 37 cooperated with researchers to complete questionnaires at short notice in 2013. As in that earlier survey, many were probably already having their Sakers marked with microchips when they visited veterinarians. Like the Saudi falconers but in poorer countries, they may well not have been prepared to pay much for extra certification, but to favour conservation solutions based on falcon veterinarians and clubs. It is therefore likely that these falconers and trappers can be an important resource for monitoring Saker populations and harvest levels by mark-recapture techniques, at least in countries that continue to permit trapping.

Secondly, there is also widespread access to veterinary facilities. Although hospitals with many assistant specialists may only be present in and around the Arabian Peninsula, it seems that single veterinarians who specialise in raptors have clinics in many more countries. Such clinics are clearly desirable for the welfare of trained hawks, and therefore to be encouraged for that reason alone. These establishments, together with requirements for non-hybrid falcons in competitions, have encouraged falconers to accept marking of their birds with micro-transponders, and were all prepared to assist with conservation of the

---

[1] CITES has been signed by almost all Saker range states except Turkmenistan.

species that are the passion of their clients. Therefore these centres too are a valuable resource for monitoring, if they can be helped to engage as they have in the past.

Thirdly, the pattern of responses relative to site visits indicated a reluctance to reveal data about Saker ownership in areas where the 2013 survey had showed that falconers were well informed about international conservation issues. The problem, indicated by discussion with veterinarians and officials of falconry clubs was a realisation that large-scale informal transport of birds across borders could create a problem for relationships between falconers and CITES authorities in the countries concerned. It was explained that popularity of competitions for pure Sakers as a public spectacle in some countries (Fig. 4) created risk of appreciable public dissent if government authorities were heavy handed.

Figure 4 Falcon races in Qatar.

These findings, especially the third, encourage reflection on the process of making international legislation through Multilateral Environmental Agreements. It is already recognised that the interactions of MEAs can create complications for conservation (Ivanova & Roy 2007, Kanie 2007). Although this recognition can lead towards synergies, conservation through sustainable use of Saker Falcons is bedevilled not only by conflicting business models (in the triangular relationship of protection, cultivation and wild-resource use), but also by cultural and geopolitical considerations.

In the MEA's, governments gather to make legislation with discussion mostly in English and sometimes without much opportunity to consult local people in the countries concerned. This may affect the lives of people who, through lack of information translation and dissemination, may have little ability to inform let alone be represented in the deliberations. Governments that are in a minority may accede to legislation proposals because of *quid pro quos* on other issues, or be overruled in voting, but then have difficulty implementing measures that provoke public dissent about wildlife; at a time of tension between interests allied to different groups in neighbouring conflicts, additional issues of this nature are not welcomed by governments. Great care is needed by MEAs in such cases, with responsibility both from Parties and powerful Observer organisations. Those wishing to conserve Sakers, and their important steppe habitats that were cradles for western civilization, need to keep their considerations broad in scope, consult widely at all levels before making decisions, and be patient. The need for such care in the case of the Saker Falcon, which inhabits an area fraught with geopolitical tensions, informs the following and final section of this report.

VIII. Recommendations, strategy and actions proposed

At this point, it is worth considering in detail some aspects of Kenward et al. (2013) which were too detailed for including in the SakerGAP (Kovács et al. 2014) as more than aspirations on conservation through use. These details included the design of a management system for monitoring Saker Falcon populations, harvests and trade through mark-recapture data. The design concepts for that system are repeated here as Annex I, with copy of the software design in Annex II. These concepts accompanied proposals for two stages of work on a Saker Management Pathway, of which the first stage has been established in this project and has produced findings relevant to the second stage, as outlined in Box 1.

Box 1. Proposals that followed from a Saker management system design in Kenward et al. (2013).

On the basis of the management system design, we recommended engagement of:
- Biologists to build networks of local land managers to mark & record productivity in breeding areas;
- Falconers and falcon hospitals to record marked birds and fund marking in exchange for information;
- Trappers to record all captures, but especially marked birds, in exchange for payment & information;
- Governments and international NGOs to support this cooperative approach to Saker management.

We also recommended work on technologies for improving population modelling and exchanging 'citizen-science' information with falconers and trappers, and conceived a pathway for implementing all these recommendations. The first stage of the pathway was considered practical rapidly and is indeed now established as the first stage of this project, as follows

Saker Management Pathway Stage 1 involves agreeing with relevant stakeholders to:
- ❖ Immediately develop a portal in Arabic offering benefits to attract falconers and trappers [***done***];
- ❖ Run surveys and competitions for information on the site to build trust [***done, repeating***];
- ❖ Promulgate the idea of not trapping adults in breeding areas or buying such birds [***in progress***].

The second phase had two options, for which the choice will depend on high level stakeholder decisions.

Saker Management Pathway Stage 2 involves either:
1. Funding for the portal to host a system for monitoring populations and regulating trade; or
2. Using the portal to promulgate exchange of data for information, bird sponsorship, etc, then using sponsorship to gradually equip the portal with tools to monitor populations and trade through trapping, and finally inserting a tool to monitor and, if necessary, regulate trade if Saker populations remain depressed.

Stage I of the Management Pathway is now implemented in more languages than Arabic. An initial survey has already confirmed the practicality of engaging falconers and trappers through the internet, and also that they already mark trained Sakers widely with the aid of veterinarians, who are prepared to help use this for conservation purposes so that a semi-voluntary system could monitor populations, harvest and trade. However, survey responses also reveal urgency of testing such a system (which could perhaps be combined with more general use of falconry passports) due to the uncomfortable position of CITES authorities in some countries at a time of growing pressure for action on wildlife trade.

Therefore in year two of the project we propose to investigate further, through portal-based survey and consultation with practitioners, and discussion with CMS via the Saker Falcon Task Force, exactly what form a management system might take in order to give parties to the MEAs confidence that states could resume legal movements of Saker Falcons without risk to conservation of stocks. In Saker breeding states, this is likely to require proposals for marking enough young Sakers to enable estimates of population sizes and harvest rates from trapping. In states where Sakers are present only as migrants or in winter, this will involve liaison primarily with veterinarians to define their requirements for operating

a system that registers birds they mark for conservation purposes as well as their own benefit. Such a system could provide practitioner-based monitoring for self-regulation, thereby combining Management Pathway options 1 and 2 above.

It is proposed that this process will involve the following four measures in Year 2 of the project:

1. Revision of the survey for falconers and trappers to remove questions that may deter completion, and possible addition of one or two more that can indicate practicality of the monitoring system. A particular interest is whether payments or prizes associated with marking of trapped birds, could motivate participation by trappers in a monitoring system, if an appropriate question can be formulated. ***Please note that this would require one or more sponsors of more valuable prizes to be maximally effective***.

2. Survey of veterinary establishments not so far visited. This should involve at least those known in Saudi Arabia and Kuwait, but ideally also in other countries indicated in Tables 4 and 5. Possibly this could subsume into arrangement of a workshop that could involve most veterinarians in wider discussion. A particular interest is whether there could be adequate added value for veterinarians, by providing them with linked SYCL sites through which useful professional information can be provided and exchanged, as well as mark-recapture data as the basis for a trade monitoring system.

3. Testing of SYCL with those hospitals that express interest in these sites for communicating with their clients in local languages (e.g. with news of offers, clinics, diet, bird-care etc). The cluster of individual SYCL sites would link to portal administration for provision of useful professional information in English or Arabic to the current central SYCL site (www.sakerfalcon.org). ***Please note that SYCL needs adjustment to handle right-to-left scripted languages perfectly, although formatting in Word and pasting into SYCL HTML editor is a workable interim solution***.

4. The current central site will have its content extended and facilities enhanced, e.g. for accessing a master spreadsheet of data from marking systems for wild and trained Sakers (entered to a DropBox as ring or transponder numbers on Excel submission templates).

Completion of this work would enable revised design of a new Phase II module, to be linked to falcon veterinary establishments and system management (Fig. 5, in **blue**). Such a module could then test a self-regulation system, but also be used for trade regulation if required.

Figure 5 Portal (as in Fig. 1) based on use a multilingual Saker template (**red**), linked to a multilingual survey module (**purple**) and SYCL sites (**green**) in each language, but with an added Phase II management module (**blue**).
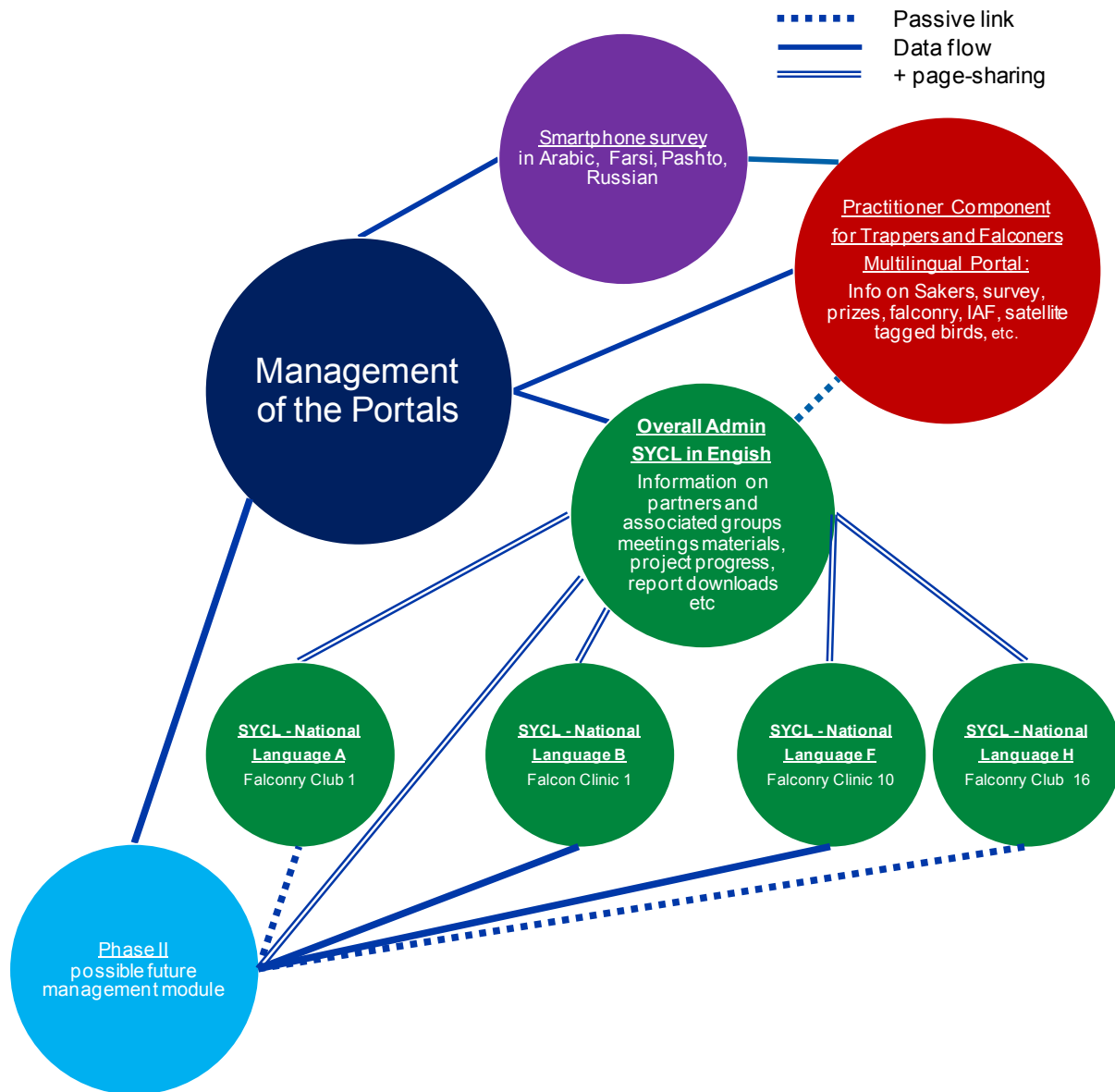
References
(Internet documents were last visited on 16/04/2016)

AlRashidi, M. (2004). [An ecological study on hunting falcon species and their protection in Saudi Arabia]. MSc thesis, Biology Department, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia. [in Arabic]

CITES (1973) Convention on International Trade in Endangered Species of Wild Fauna and Flora. Available at: http://www.cites.org/eng/disc/E-Text.pdf

CMS (1979) Convention on the Conservation of Migratory Species of Wild Animals. Available at: http://www.cms.int/en/convention-text

Kovács, A., Williams, N.P. and C.A. Galbraith (2014) Saker Falcon *Falco cherrug* Global Action Plan (SakerGAP), including a management and monitoring system, to conserve the species. CMS Raptors MoU Coordinating Unit, Abu Dhabi. CMS Technical Series No. XX. Available at: http://www.cms.int/sites/default/files/document/Inf_10_8_SakarFalcon_GAP_Eonly.pdf

Dixon, A., Batbayar, N., Purev-Ochir, G. and N. Fox (2011) Developing a sustainable harvest of Saker Falcons (Falco cherrug) for falconry in Mongolia. Pages 363-372 in R. T. Watson, T. J. Cade, M. Fuller, G. Hunt & E. Potapov, eds. Gyrfalcons and Ptarmigan in a changing world. The Peregrine Fund, Boise, Idaho, USA.

Dixon, A., Ming, M., Gunga, A., Purev-Ochir, G. and N. Batbayar (2013) The problem of raptor electrocution in Asia: case studies from Mongolia and China. Bird Conservation International 23:520-529.

Dixon, A. (2016) Commodification of the Saker Falcon *Falco cherrug* : Conservation Problem or Opportunity? pp. 69-89 in F.M. Angelici (ed.) Problematic Wildlife. Springer International, Switzerland. DOI 10.1007/978-3-319-22246-2_4

Fox, N.C., Eastham, C.P. and H.J. Macdonald (1997) ERWDA handbook of falcon protocols. Emirates Research and Wildlife Development Agency, Abu Dhabi.

Fox N., Barton N. and E. Potapov (2003) [Conservation of the Saker and Falconry]. Steppe Bulletin 14:28-33 [In Russian].

IUCN (2000) IUCN Resolution WCC2.74. Conserving the Saker Falcon. http://www.sakerfalcon.org/data/00063/IUCN2-74_635578775192801569.pdf

IUCN (2008) IUCN Resolution WCC4.26. Trust building for biodiversity conservation and sustainable use in line with the *European Charter on Hunting and Biodiversity.*

Ivanova, M. and J. Roy (2007) "The Architecture of Global Environmental Governance: Pros and Cons of Multiplicity," (PDF) in Global Environmental Governance: Perspectives on the Current Debate, (Lydia Swart and Estelle Perry, eds.), New York: Center for UN Reform Education. Available at: http://www.centerforunreform.org/sites/default/files/Ivanova%20and%20Roy%20GEG.pdf

Kanie, N. (2007) Governance with Multilateral Environmental Agreements: A healthy or ill-equipped fragmentation? In: Global Environmental Governance: Perspectives on the Current Debate, (Lydia

Swart and Estelle Perry, eds.), New York: Center for UN Reform Education.

Kenward, R., Katzner, T., Wink, M., Marcström, V., Walls, S., Karlbom, M., Pfeffer, R., Bragin, E., Hodder, K. and A. Levin (2007) Rapid Sustainability Modeling for Raptors by Radiotagging and DNA-Fingerprinting. Journal of Wildlife Management 71: 238-245.

Kenward, R.E. and M.J.G. Gage (2008). Opportunities in falconry for conservation through sustainable use. Pages 181-204 in Sielicki, J. and T. Mizera. (eds.): Peregrine Falcon Populations - status and perspectives in the 21st Century: EPFWG/Turul, Warsaw.

Kenward, R.E., Pfeffer, R.H., Al-Bowardi, M.A., Fox, N.C., Riddle, K.E., Bragin, Y.A., Levin, A.S., Walls, S.S. and K.H. Hodder (2001). Setting harness sizes and other marking techniques for a falcon with strong sexual dimorphism. Journal of Field Ornithology 72:244-257.

Kenward, R., AlRashidi, M., Shobrak, M., Prommer, M., Sielicki, J. and N. Casey (2013) Elaboration of a modelling framework to integrate population dynamics and sustainable use of the Saker Falcon *Falco cherrug*. UNEP-CMS Office, Abu Dhabi.

Riddle, K. E. and J.D. Remple (1994). Use of the Saker and other large falcons in Middle East falconry. Pages 415–420 in B.-U. Meyburg and R. D. Chancellor, editors. Raptor conservation today. World Working Group on Birds of Prey, Berlin, Germany.

UNESCO (2012) Inscription **Falconry, a living human heritage** on the Representative List of the Intangible Cultural Heritage of Humanity. Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage. Decision 7. COM. 11.33.

This conceptual model requires mathematical predictive models. One type of model is for population demography to estimate harvests possible from different Saker populations. Another is to estimate sizes and trends recording markers on young falcons and sizes of harvests, possibly complicated by need to identify origins of birds trapped without markers. The first model will require expanded work in breeding areas, with survival parameters a knowledge gap to be overcome by improved techniques. The second model lacks important data on numbers of falconers and trappers, though survey indicates that these knowledge gaps too can be overcome if engagement of those stakeholders can be organised adequately. Models of a more socio-economic nature would be needed to optimise flows of information and payments in such a system (Fig. 6).

Figure 6   An outline of the data and motivation flows (economic and regulatory) between actors that need to be modelled in a possible management system for Saker falcons.
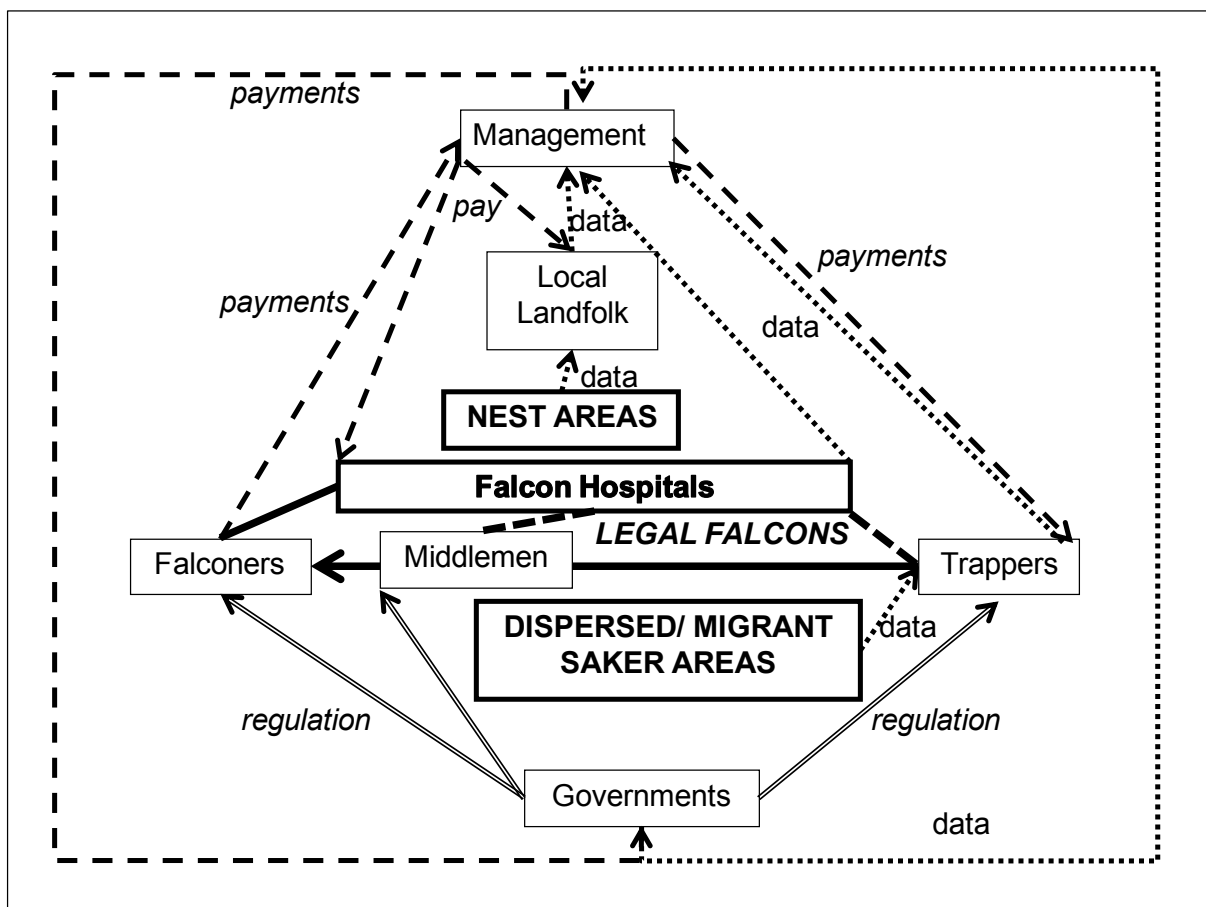
Operation and modelling in such a conservation management system would need :

1. For population monitoring, local land managers in breeding areas to record nest productivity, mark young, and provide feathers (DNA) in exchange for payments (P_m) from a conservation budget; local people could also benefit by providing information about illegal trapping.

2. For population monitoring, trappers and/or veterinarians to record and provide feathers (DNA) and other simple data from birds they capture, in exchange for payments (P_t) from the necessary conservation budget (B).

3. For trade control, falconers to require birds marked to certify legal-origin, for which ultimately a fee (F) is contributed to the conservation budget (ΣF).

4. For trade control, trappers to agree to supply data from trapped birds, ultimately in exchange for permission to trap and share the harvest quota (H_i) from population i.

5. For detailed population monitoring and social acceptance, for scientists to find geographic markers through start-up finding, supplemented later by a proportion (s) of the conservation budget ($s\Sigma F$).

6. For social acceptance, governments in j countries to share payments for logistic or scientific support from a proportion (g) of the conservation ($g\Sigma F$) supplemented initially by start-up funding.

7. **At start-up, an initial conservation budget (B) and funding for socio-technological infrastructure**.

This approach has become progressively more feasible since 2000. Due to improvements in mobile technology, the otherwise rather intractable problem of dealing with trappers (2,4), exacerbated by the loss of infrastructure due to conflicts in some home countries, is probably practical. Thanks to UAE efforts and KSA surveys, copied in other countries, falconers are now more organised and contactable too (3). Saker issues have generated funding leading to contacting of more and more local people (1) and relevant science (5), including the ability to deter tampering with markers on trapped hawks by banking genetic material at the time of marking for 'mark-bank' comparison with fresh material from a bird (Kenward & Gage 2008). Thanks to UAE efforts initially, and with IAF for the inscription by UNESCO (2012) of falconry as an intangible cultural heritage, many range-state governments are engaged (6), while socio-economic studies of resource use and technology have advanced substantially too. The socio-technological design needs to be based on mobile phone apps, which could provide a new infrastructure for central-local communication to provide instructions, collect data and deliver payments to trappers and local people (7).

For socio-economic modelling it will be especially important to understand:

1. Levels of reward for legal compliance (e.g. payments for marking to trappers, P_t, and local land-managers, P_m) at which compliance becomes more cost-effective for trappers than illegality. Such calculations must include hidden costs of compliance (e.g. costs of time for reporting) as well as hidden costs of non-compliance (e.g. detection probability and value of fines).

2. Whether the fees (F) that are practical can combine with likely size of harvest (i.e. $F \times \Sigma H_i$) to cover the cost of running the system (including central administration, payments for marking and to a number (i) of governments for facilities), to ensure long-term socio-economic sustainability and ideally enough marking payment for local people (P_m) to motivate habitat conservation.

Promising results on costs and benefits which favour or deter illegal hunting are starting to come from studies of bushmeat procurement (e.g. Knapp 2012). A critical knowledge gap at present is whether falcon hospitals could contribute through marking to fees (F) for a conservation budget.

Governments would be rewarded (by recognition, technology/skill transfer and possibly funding) for logistic and scientific support with regulations and data on populations. Collection of feathers at the time of marking is important, as it provides DNA as a control against marker tampering and for population genetics in mark-recapture estimation. Feather handling needs an envelope and foolproof system. Other serious knowledge gaps are whether governments would help with this in exchange for the payment in country j of ($g_j\Sigma F$), and whether CITES could approve transport of feathers, as a non-destructive sample, to approved institutions.

Whereas population modelling is a well-recognised process, the proposed socio-economic modelling is likely to evolve during implementation. The important thing is to recognise the need for such modelling and to plan processes within the management system for recording at least the above variables, whose possible interactions can again be modelled in MS Excel. This is an integral part of the management system design, based on Use-Cases in Annex II.

Annex II   Use-Cases for a management system, from Kenward et al (2013)

This Annex provides information used in preliminary costing for a system to monitor falcon capture and transportation across borders. It is a rough estimate of what is required, with Use-Cases listed to estimate the time required for programming, but not for initiating and testing the system. The cost would comprise about eight person-months of programming and four of administration and testing. Some re-design would be necessary to take make best use of Phase I findings, for example with much tagging done by vets. It may also be possible to make some savings on the complete system through not activating a trade control system initially, and through use of new systems for retrieving and managing veterinary records by reading micro-transponders, but the interfacing could also increase costs. The cost for a revised design is therefore unlikely to be appreciably below US$150,000.

It must be noted that, although the administration team to manage such a system could be small (a single administrator is foreseen) the steering team needed to develop rules and protocols acceptable to all stakeholders would be larger. Indeed, managing that steering group would require appreciable time from the administrator (or part-time administrators). The steering group would at the least need representatives of CITES, CMS and major stakeholders (e.g. falconers, other conservation interests). Whether the group should also include scientists (other than represented among those mentioned) and range states in another form than represented among the falconry and other conservation interests, would need decisions too. Rather than increase the size of core steering an alternative might be to have a separate science, technology and range states (STARS) group.

Application Overview

The following is an overview of the design for information technology which could be used to manage a system for monitoring raptor harvests and population sizes and trends on the basis of (nest-based) marking and (trapping-based) recapture, by exploiting new communications technology in mobile phones and the internet. The concept is based on the combination of rings and microchips used and recorded by biologists, trappers, falcon hospitals and falconers, which was used to demonstrate possible data flows in Kenward et al. (2001). Although such a system could work (and be motivated) on a voluntary basis, it could also double as an enforcement tool.

The system comprises six different areas of development, each a different interface to a central database. These are interfaces for System Administration, Biology Administration, Taggers, Falconers and Trade Controllers and a public-facing interface, known as the Access pages, to provide a point of entry to the browser-based interfaces, a description of the project to the wider public and an advertisement to falconers who wish to join the project.

Central to the application is a database. The database is accessed through web pages for all users except for trade controllers and veterinarians, who will need non-browser-based software to control specialised tag scanning hardware. Taggers will be able to supply a small amount of data with their mobile phones as described below.

The system administrator interface will allow administrators to create and edit all the user accounts and give them access to the various areas of the application. Administrators have access to all areas of the application and can also manage payments and trade control communications. Biology administration manages the bird data, creating and managing bird records and history. Outside of the software they will send a tag and an envelope containing the code of the specific bird to a tagger.

Taggers trap birds and attach the tag sent by the biology administration. When they have attached the tag they will send an SMS text message which is received automatically by the system so the bird

data can be updated automatically. They will also send a feather back to the biology administration in the provided envelop so that biology administration can update DNA data for the bird. Taggers also have their own web interface in order to view tagged birds and payments made to them. This aspect will need re-design to accommodate requirements of tagging by veterinarians

Falconers can register their birds with the system and match their birds with individuals already recorded. They will be able to view the bird's history but may have to make payments to use the system unless they are working through veterinarians.

Trade control (e.g. customs or police) officials will have access to terminals, personal computers, tablets or smart phones, running Windows, iOS or Android, running forms-based software. They will scan bird tags as they come through customs; the scan data will update the bird record in the central database. They will be informed via the terminal if the bird is not legal and will be instructed to send a feather if a bird has no tag.

The application also includes a messaging system that provides pages for all users to contact other users, ask support from administrators, reply to messages and carry on conversations. Communications relating to the project are kept in a central place and can searched and referenced more easily than with disassociated email. Users are, of course, emailed when a message arrives but will link from the email back to the Saker system in order to reply.

The coding time estimate takes into account the following requirements:

- A large part of the application is designed as a web application running through a suitable web server such as Internet Information Server (IIS) on a Microsoft server operating system or Apache on Linux.
- The application is to be developed in Microsoft .Net 2010 with ASP .Net written in C#, if running on IIS, or in PHP if running on Apache
- Application data are to be stored in a relational database, e.g. SQL Server or MySql. Database tables will be optimised with indexes and will be normalised as far as is sensible for optimal performance.
- XHTML, CSS and JavaScript are to be used to manipulate and display the application in the browser. This code will be written to W3C accessibility standards.
- The user interface is designed to run in Internet Explorer versions 8 and above, Mozilla Firefox, Apple Safari, Opera and Google Chrome. It will run on any computer that supports the above browsers e.g. Microsoft Windows, Linux variants and MAC OS. It is possible to develop the applications to run the pages in smart phones and tablets browsers though this has not been costed.
- The application is to use third party web services where necessary and available, for example to take and distribute credit card payment.
- To receive SMS text messages, a GSM (Global System for Mobile Communications) modem must be attached to the server, or to a remote computer that can communicate with the server, and suitable software, written in Java, C#, C++ or PHP, must be created to communicate with the modem, parse the received messages and insert the data in the database. Alternatively it may be pertinent, for example if a phone signal is not available, to use a third party service such as Twilio to send and receive messages and pass the message to our server.
- The trade control application controls an RFID scanner and it is unlikely that any provided developer toolkits can be run from a browser, although software for veterinary records may do so. This means this application will use a runtime that can access the native API and will be written in Java, C#, Objective C or C++ depending on the developer toolkit provided.

Actors in this costing include:	The developer: costed for Anatrack and its development partners
	System administrators: set up and edit all users and manage payments
	Biology administrators: manages bird data
	Taggers: veterinarians tag birds routinely, others are paid for tagging
	Falconers: register birds, view bird history and make payments
	Trade controllers: scan bird tags, view birds info and are alerted to illegal birds

All except for the developer is considered an application user; each actor above has a proprietory interface. A design and preparation stage must be completed before the application is programmed.

Action	Description
Design and Preparation	
Analysis and architecture	Build a requirements list, identify data objects and functionality and create formal designs based on these.
Specification document	Complete with costings and roadmap
Wireframe designs	To indicate GUI requirements (approx. 60 pages @ approx. 1 hour each)
Database design	Designing the database tables, fields, indexes and data relationships and scripting to SQL so it can easily be installed.
Graphic design	General graphics design for web page and form layouts of each application. This is crucial for a professional looking application though is as important for usability as for good looks.
Environment setup	Setting up a development environments (installing software, databases, creating paths etc.)
Payment mechanism	Payment is critical and could be mixture of one-off and subscription payments, credit card and direct debit, automated and manual processes. A suitable payment engine should be selected. Payment could be handled by the chosen engine's own payment pages but these would need to be integrated into the application. Note that the procedure for acquiring payment engine accounts often takes several months to complete.
Messaging mechanism	Users could be encouraged to communicate with each other through a web-based messaging system built in to each of the interfaces. As well as emailing the relevant users, the message would be stored in the database for a central record of conversations, to help solve disagreements and to log ideas/enhancements etc.
System Administrator Interface	
The system administrator interface will run in web pages for remote access to the central database	
Template and navigation	Includes page furniture to appear throughout the administrator web pages with links to all pages in the administrator tool.
Login	Access to administrator tools must be restricted. Here he enters user name and password
Forgot password	Two pages and an email to allow user to reset his own password. For security, all system passwords are encrypted and cannot be read directly.

View/edit details	Allows for changing name, address, password etc.
List users	List all users for editing. Filters and search tools help find events quickly.
Create users	Create other system users: administrators, biology admin, taggers, falconers and trade controllers
Edit users	Change their details, name, email address, password and role
Email users	Bulk email users from the application or email individuals
View user events	Provides the ability to quickly see user activity - log in, event creation etc.
Access to biology admin accounts	Use biology admin application as if the administrator had logged in as a particular biology admin user.
Access to tagger accounts	Use tagger pages as if the administrator had logged in as a particular tagger.
Access to falconer accounts	Use tagger pages as if the administrator had logged in as a particular falconer .
List trade control installations	A list of the trade control sites or mobile agencies
View/edit trade control installations	Allows set up and logging of trade control sites or mobile agencies for recording where they are and providing an installation code to identify communications from the installation.
Delete trade control installations	Delete an installation record
List payments	View all payments made
Create payments	Make payments to users as required. So that all payments are recorded within the system, refunds must also be made through the interface.
Manage messages	As part of the databased messaging system, admin can view, filter and search all messages and conversations, create new messages to start a conversation or to reply to another message. Messages are emailed as well as stored in the database.
View user conversations	A specific list of conversations for a particular user. This would be accessed from the user's page and includes search tools.
Biology Admin Interface	
Template and navigation	Includes page furniture to appear throughout the biology admin web pages with links to all pages in this interface.
Login	Biology admin enters username and password to allow him to use these pages. As for system administrator.
Forgot password	As for system administrator
View/edit details	Allows for changing name, address, password etc. As for system administrator
List birds	List all birds currently registered. Biology admin can use filters and search tools to help find an individual bird quickly.
View bird	Allows the biology admin to view the bird details. This will include a generated bird code for sending to taggers for them to send back in an SMS text message. Images can be viewed.
Create bird	Creates a database record for a bird. This data in this record will populated by the biology admin and the other actors.

Edit bird details	Edit the bird data record such as the description, location caught, feather received, recognition code etc.
Add bird images	Photographs of the bird can be uploaded.
Delete bird	Delete a bird record only if it is not valid or a repeat.
Merge birds	It is possible that two separate records are created for the same bird for example, a falconer registers a new bird that turns out to be already logged. This functionality allows the records to be merged, keeping the events and, where possible, the details for both records.
Manage bird events	Bird events describe a history of a bird as it is initialised, one of its feathers is received and analysed, it is tagged, registered with a falconer, passed through customs, dies etc. The biology admin can see these events and may be able to create/edit/delete them as he sees fit. Events have a User, Type, Description and Date associated with them.
Create "Received feather" event	The biology admin will definitely create an event when he receives a feather from a tagger.
View bird alerts	Displays a summary of bird alerts and other reports
Contact admin/manage messages	As for other users, this provides a system-recorded way of contacting admin or other users with queries and continuing conversations. Includes the ability to view, filter and search conversations, create new messages and continue conversations.
Tagger Interface	
Receiving SMS text messages	Text messages received from the tagger must be parsed and the data for the relevant bird written to the database. There are two sensible ways to deal with the small amount of traffic anticipated: either connect a GSM modem to the server or imploy a third party such as Twilio to intercept messages and send them to our server. The SMS will parse for bird code and telephone number. A "tagged bird event" database record is created for the bird matching the code and tag user matching the telephone number. Repeat events and events with unrecognised codes and telephone numbers are also logged and flagged as alerts for the biology admin
Template and navigation	Includes page furniture to appear throughout the tagger web pages with links to all pages in this interface.
Login	Tagger enters username and password to allow him to use his pages. As for system admin.
Forgot password	As for administrator
View/edit details	Allows for changing name, address, password etc. Importantly, the tagging mobile telephone number can be changed in order to recognise the user sending the SMS
View/edit payment details	Depending on the payment mechanism utilised, the tagger and view and perhaps edit the details of the bank account/paypal account/credit card to which payments are sent.
View birds	View a list of birds tagged with a limited view of events
View payments	View a list of payments to date

Contact admin/manage messages	As for other users, provides a system-recorded way of contacting admin or other users with queries and continuing conversations. Includes the ability to view, filter and search conversations, create new messages and continue conversations.
Privacy Policy	What we do with collected data
Terms and Conditions	What a user can do with the application
Falconer Application	
Template and navigation	Includes page furniture to appear throughout the falconer web pages with links to all pages in this interface.
Signup	Falconers can sign up to the use the application. They enter username, password, contact details, etc.
Login	Falconer enters username and password to allow him to use these pages. As for system admin
Forgot password	As for administrator
View/edit details	Allows for changing name, address, password etc
List birds	List all birds currently registered to logged in falconer. Filters and search tools to help find an individual bird quickly.
View bird	Allows the falconer to view the bird details and its history.
Register exisiting bird	Falconer registers a bird by entering the provided bird code. This will create a bird registration event.
Register new bird	Falconer can add a bird he already owns to the system. This will create a bird registration event. Bio admin is alerted to send tag/envelope.
View payments	View payments made to the system
Make payment	Payments are made either on registering a bird or on sign up.
Privacy Policy	What we do with collected data
Terms and Conditions	What a user can do with the application
Trade control Interface	
System start-up	The software runs when the system starts. There is no login - system has been installed with a unique code to identify it.
Interface and navigation	Create the interface and buttons to different parts of the application
Test connection	The software regularly tests its connection to the central database and alerts the user if there is a problem.
Store data locally	If the internet connection is lost, store input data locally until it is restored.
Software update	The software is alerted to new versions and automatically updates itself.
Scan tag	RFID scanner is attached to the terminal. When it is used to scan a tag on a bird, the tag data and terminal id is automatically posted to the remote database to create a scanned bird event record for the bird.
View bird details	The server responds by posting back the bird details. This will include the legal status of the bird so that suitable action can be taken.
Report untagged bird	If bird is untagged, trade control and biology administration are alerted so that suitable action can be taken.

Access Pages	
Graphic Design	These pages are public-facing and need to be suitably styled and layed out.
Template and navigation	Site headers and footers for every page. Would include links to the various user applications.
Home Page	Introduction to the project. Photographs and screenshots
About	Describes the project in more detail.
Privacy Policy	What we do with collected data
Terms and Conditions	What a user can do with the application
Cookies policy	Provide explanation of cookie use and allow user to agree to their use (users cannot log in without cookies enabled)
Contact Us	Provides contact details and form to message the system administrator
Search Engine Optimisation and Registration	Site needs to reach the those who are interested

Other Application Tasks	
Help Files	Implementation of a help file system and integration with all the applications.
System Testing	The system will be comprehensively tested by the developer. It will also need to be tested by non-development staff or final users.
Encryption for secure data transferal	Displaying login and cc card pages over a secure socket layer (SSL) for secure data entry
Exception handling	Trapping exceptions and passing them to the developer whilst displaying a friendly message to the user.
Server specification and selection	Servers and a hosting solution need to be selected to run the applications and database with an eye to performance and on-going cost.
Trade control terminal and tag scanner specification and selection	Terminals for running the trade control software need to be selected along with the scanners for the tags
RFID tag specification and selection	Suitable RFID tags for attaching to birds must be selected.
Server patching strategy	Describes a mechanism to update the operating software (OS and databases) on the live servers with the minimum of downtime.
Load balancing and redundancy strategy	Describes a mechanism for adding new servers to the application in case the current hardware cannot support the user load (makes the application scalable). It also considers a database redundancy mechanism as emergency backup, possibly automated in case of primary database failure. This needs to be considered but there may be no work to be done as the user base, and server loads, will not be large.
Application installation and update strategy	Automated scripts to aid recompilation and database rebuild. Describes a mechanism to update to the live application with the minimum of downtime.
Backup mechanism design and development	Automated scripts to transfer compressed copies of the database to a remote location. In case of total server failure, the application can be reconstructed from these backups.

Staging setup	This is where updates to the system will be tested for user acceptance. It needs to run web and database server software, a GMS server and a firewall. The small-to-medium sized scale of the project suggests it will not need load balancing.
Live setup	This is where the final system resides after thorough testing. It needs the same hardware and operating software as the staging setup.
	TOTAL HOURS 1,090

Notes

Development documentation can be provided in as much detail as required but has not been costed.

As well as the time required for coding there are a number of architecture and design tasks as well as time required to specify server and terminal hardware and install the software. There is a approximately 140 days of development work for the application laid out but this might change as other requirements become clear.

There are a number of uncosted tasks including the costs of hosting the web applications and database, trade control hardware acquirement and software installation, system testing, training and support, use of a third party payment and/or SMS engine, content creation for some of the pages and system use. The cost of these elements cannot be estimated here. They include:

Hosting hardware and software	This is the cost of physical or virtual machines, owned or rented and hosted at a data centre. It includes the cost of licences for software required to run the database, receive SMS text messages and serve web pages.
Tag hardware	Each bird will need a RFID tag. A number of these will also be required for testing purposes.
Trade control and veterinary terminal hardware	Trade control and veterinary officials will need computers with an RFID tag scanners attached to each. Scanners, and in some countries also the computers, will need to be provided by project administrators.
Trade and veterinary terminal software installation	Trade control and veterinary hardware will need to be set up to run the software to scan tags and communicate with the central database.
System and acceptance testing	Crucial to guarantee a stable and functional web application. The more the application is tested, the better. This should not be completed by the developer.
Training, support and help page content.	Users, particularly taggers and trade control or veterinary officials will need training in the use of their applications. Though this should be minimal, it should be factored in to project costs. Administrators will need to supply support to users, answering usage questions via email or on the phone. All applications will need comprehensive help pages. The better the written help, the less time will be needed to train users or supporting them.
Access page content	The marketing pages will need clear and to-the-point content - images and text to explain the content and to encourage falconers to participate.
Payment engine costs	The payment engine provider will specify a fee for use of its product.
Third party SMS service	If required, there will be a fee for this service
System administration	There is a cost involved with running the system, administration of users and payments and other tasks.