

Ecological and Socio-Economic Modelling – Results of Recent Study

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Saker Task Force Stakeholders Conference
Abu Dhabi, 9-11 September 2013



Tasks

1. Review existing population data and modelling.
2. Develop demographic models for the range of Saker populations to create a global modelling framework.
3. Using best available evidence, the modelling should:
 - reveal Saker Falcon population dynamics, including effects of varying productivity, recruitment & mortality;
 - simulate potential effects of harvesting of females and males at different stages of life i.e. nestlings, fledglings, dispersing juveniles and adults, and breeding adults;
 - identify parameters which impose critically important pressures & thus require highest levels of data quality;
 - [be transparent & auditable/usable by all stakeholders].
4. Develop a socio economic model, to be integrated with the population demographic modelling, to elaborate sustainable use of the species for falconry purposes.

Review (Mátyás)

	Countries /Sites	Nests	Average brood size (nestlings/ fledged brood)	Nest success (proportion of clutches that fledged young)	Productivity (nestlings per clutch)
Europe					
Europe (means)	7	3562	2.59	0.64	2.21
C. Asia (means)	3	462	3.61	0.85	3.04
RUSSIA (Altai)	1	436	2.67	0.71	1.90

Modelling in:

Kazakhstan (matrix) [Harvest] resilience, decline (**adults!**)

Hungary (Vortex) Artificial nests to increase sites & safety

Mongolia (matrix) Harvest potential from artificial nests

Bulgaria (matrix) Reintroduced population development

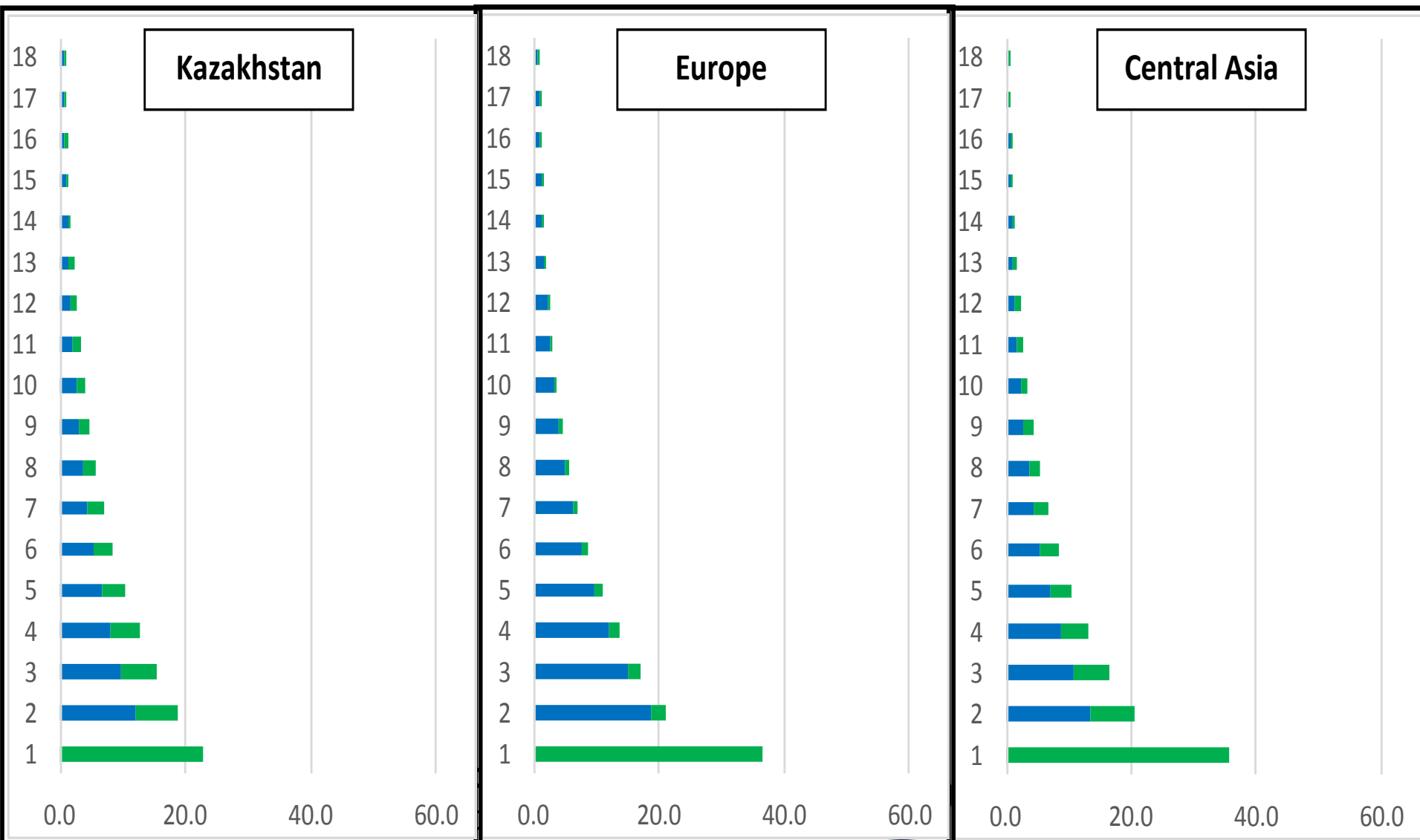
A brood of Kazakh sakers radio-tagged to study survival.
The saker is a highly fecund species.



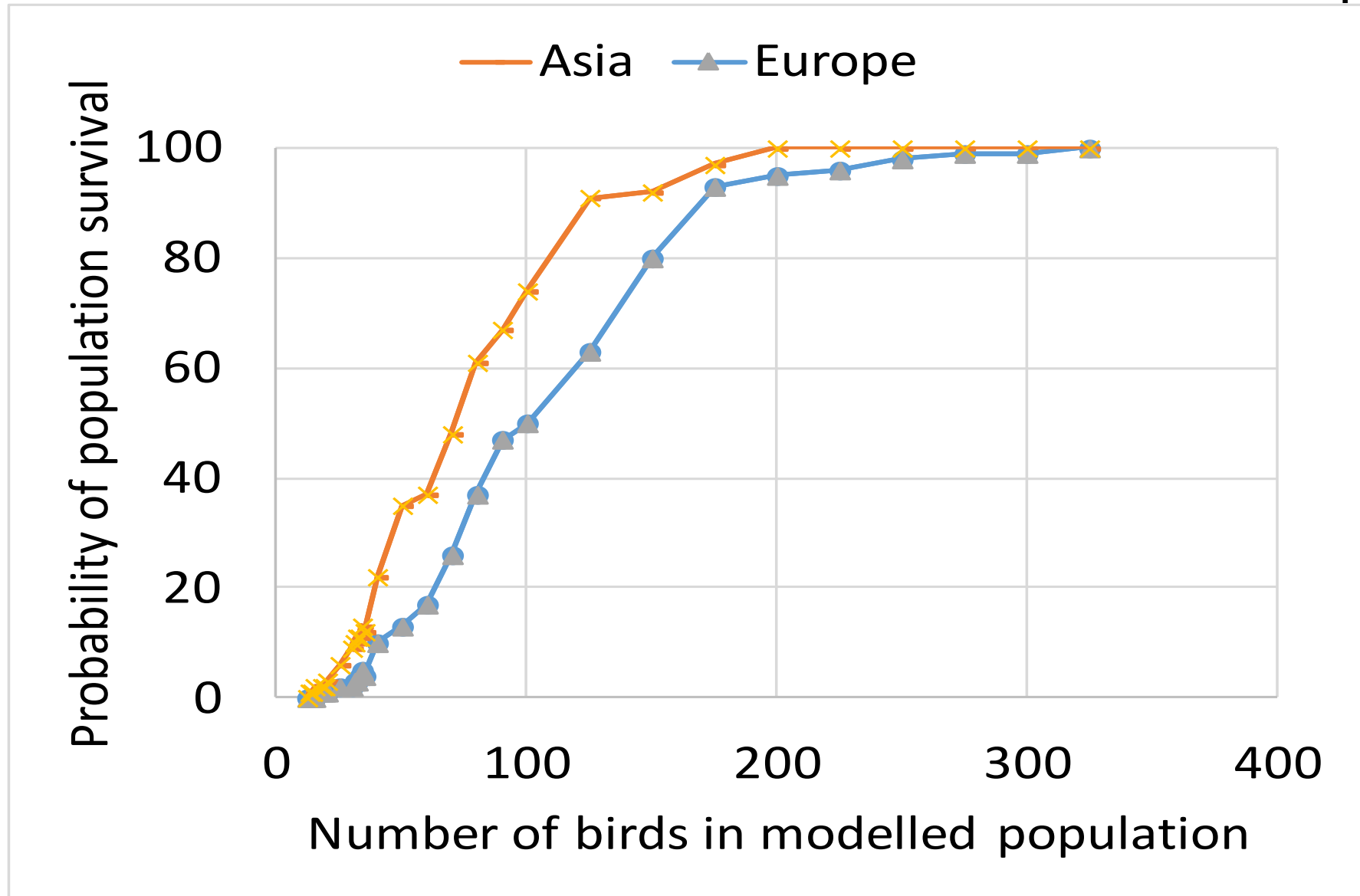
Despite extremely low rates of return of radio-tagged young to natal areas, older survival of 82% from genetics gave population stability with 64% of adults breeding. In Europe, 36% of satellite tracked young survived 9 months; year 2 survival of 52% was interpolated to an adult 80% estimate.

	Original Kazakhstan data	Europe (conservative survival)	Asia (conservative survival)
survival rate to 9 months	23%	36%	36%
survival rate 10-21 months	82%	58%	58%
survival rate 3+ year	82%	80%	80%
expected breeding rate in adults	64%	89%	65%
young / pair that lay eggs	3.10	2.20	3.00
harvest rate of juveniles	0%	0%	0%

For each year class (maximum age 18), breeders are blue bars and non-breeders green. Short green bars indicate low resilience in Europe.



Population sizes that Vortex models estimate to persist with the survival & breeding parameters shown; in Asia, 200 birds are stable, but 325 would be needed in Europe.



Effects on maximum sustainable harvest, with 85% of adults breeding, of varying the basic survival rates. With survival 36%, 58%, 80% and productivity 3 young/pair of Asia, maximum harvest with 85% breeding would be 22% (column 2). Yellow shows changed parameters, green shows harvest sustainable at breeding rates of 84-85%.

	Asian productivity, conservative survival						
Column 1. (the text below explains the contents of columns 3- 8 in more detail)	2. basic survival	3. adult survival up 3%	4. adult survival 3% less	5. mo 9-21 survival up 9%	6. mo 9-21 survival 7% less	7. mo 0-9 survival up 6%	8. mo 0-9 survival 5% less
survival rate to 9 months	36%	36%	36%	36%	36%	42%	31%
survival rate 10-21 months	58%	58%	58%	67%	51%	58%	58%
survival rate 3+ year	80%	83%	77%	80%	80%	80%	80%
breeding rate for adults	85%	85%	85%	84%	84%	84%	84%
young / pair that lay eggs	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Maxi. harvest of juveniles	22%	33%	11%	33%	11%	33%	10%

Estimates of survival during the first 9 and 12 months of life from ringing of nestling Saker falcons in Hungary during 1951-2013 (data kindly provided by Birdlife Hungary).

	Dead	Injured (later dead or not known)	Injured (later released)	Dead + injured
up to 9 months	21	8	0	29
between 9 and 12 months	6	0	0	6
beyond 12 months	20	6	4	30
Total	47	14	4	65
Survived 9 months	55%	56%		55%

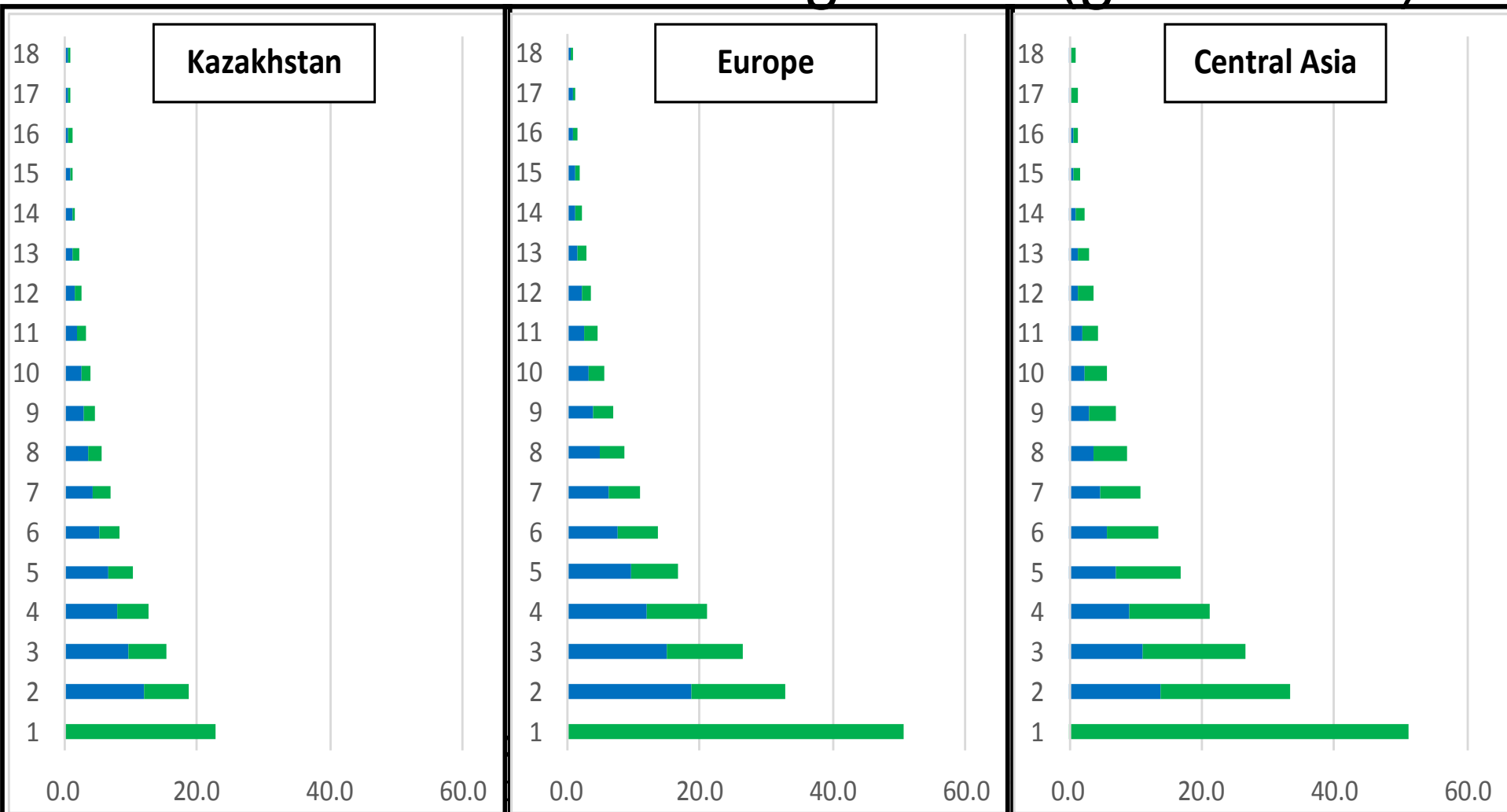
50% survival to next breeding season is as low as for male goshawks (49%), lower than for female goshawks (66%), buzzards, kites, eagles ($\approx 70\%$)



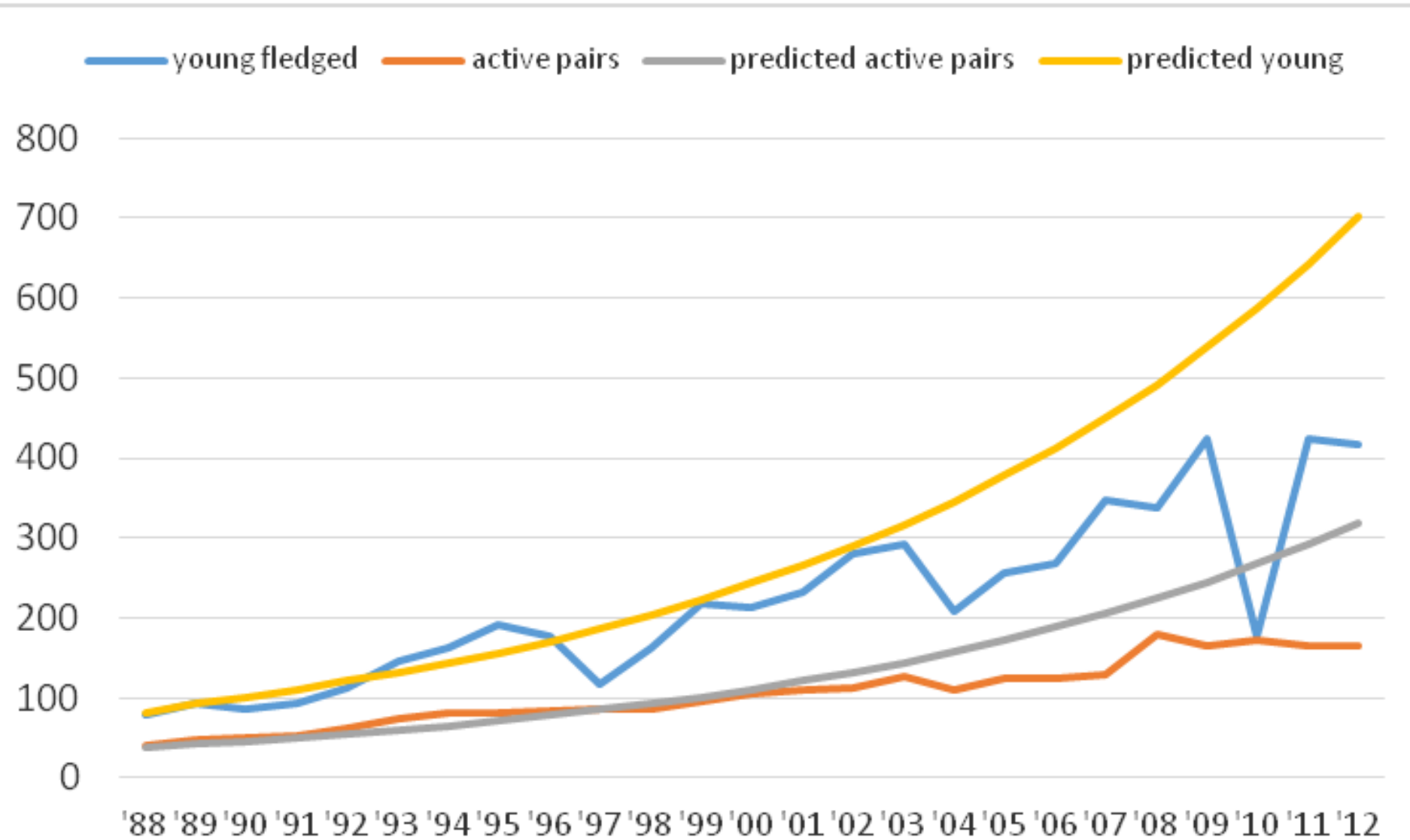
Survival rates are increased to accommodate the new (yellow) estimate for juveniles from ringing in Hungary. There are not only far more survivors from 100 birds fledged than in the original Kazakh scenario (left), but greater resilience at stability due to more non-breeding adults (blue).

	Original Kazakhstan Data	European Plausible Survival	Asian Plausible Survival
survival rate to 9 months	23%	50%	50%
survival rate 10-21 months	82%	65%	65%
survival rate 3+ year	82%	80%	80%
expected breeding rate for single adult	65%	57%	42%
young produced per pair that lay eggs	3.10	2.20	3.00
harvest rate of juveniles	0%	0%	0%

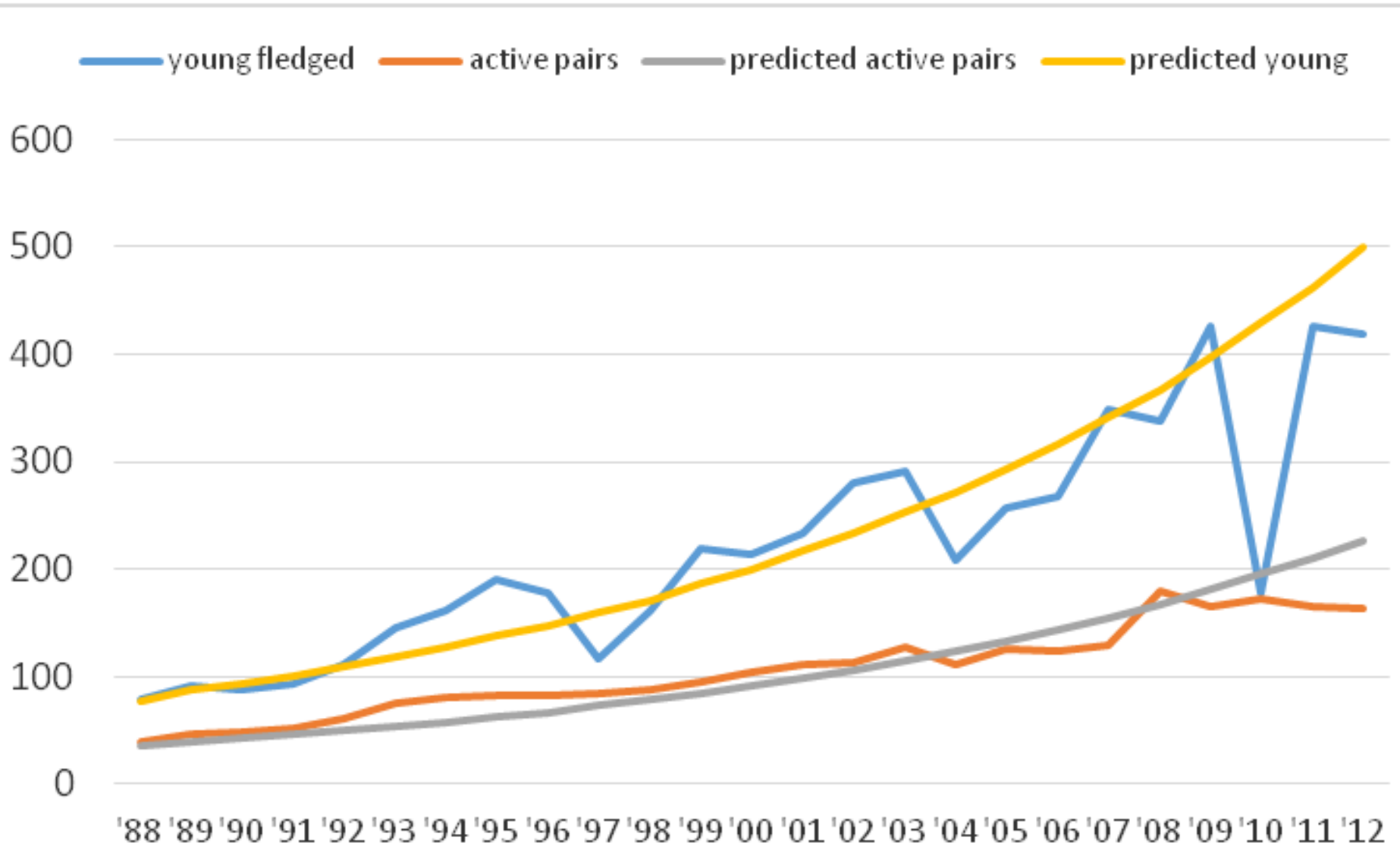
More plausible survival gives not only far more survivors from 100 birds fledged than in the original Kazakh scenario (left), but more resilience due to more non-breeding adults (green bars).



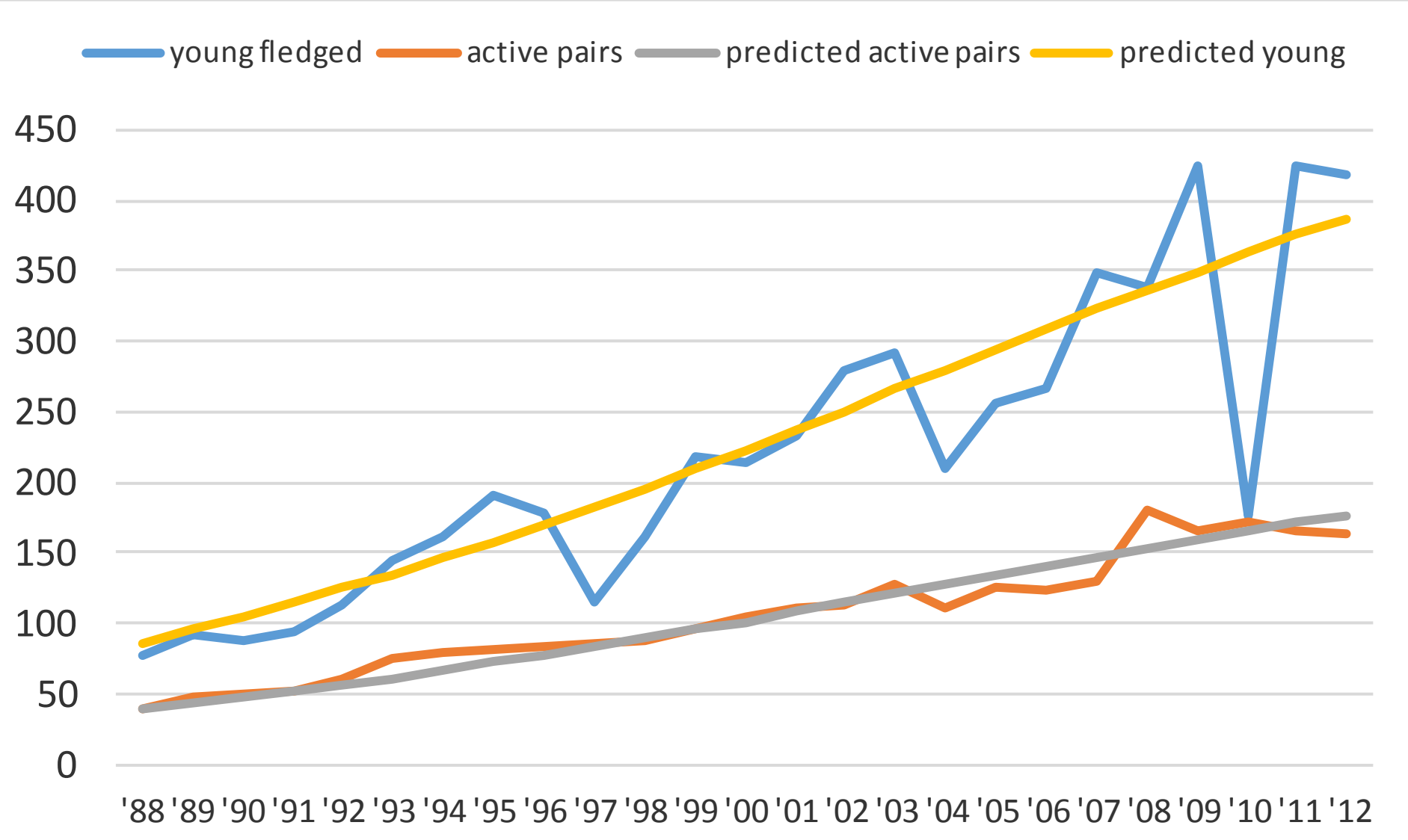
Compared with active nests & fledged young in Hungary, constant 90% breeding rate and 50%, 65% and 80% survival matched initially but exceeded reality later.



Whereas constant 85% breeding rate, matched better, but gave too few nests initially and too many later.



Models matched numbers of active nests and fledged young in Hungary if breeding rates declined from 95% to 70%, or from 85% to 60% with 4% increase in survival.



Socio-economics (Monif, M. Shobrak & M. Al Kathlan)

31 falconers (27 active) had 61 falcons, of which 52% were wild sakers (worth US\$8,000 on average) and 8% hybrids. ALL active falconers had their birds marked with microchips by falcon hospitals. 91% preferred wild sakers, kept them 4 years on average and then sold them (66%), although 16% died.



Trappers and falconers in Saudi Arabia

Trappers were usually falconers. Trapping was legal, so data could be given without fear, but needed trust.

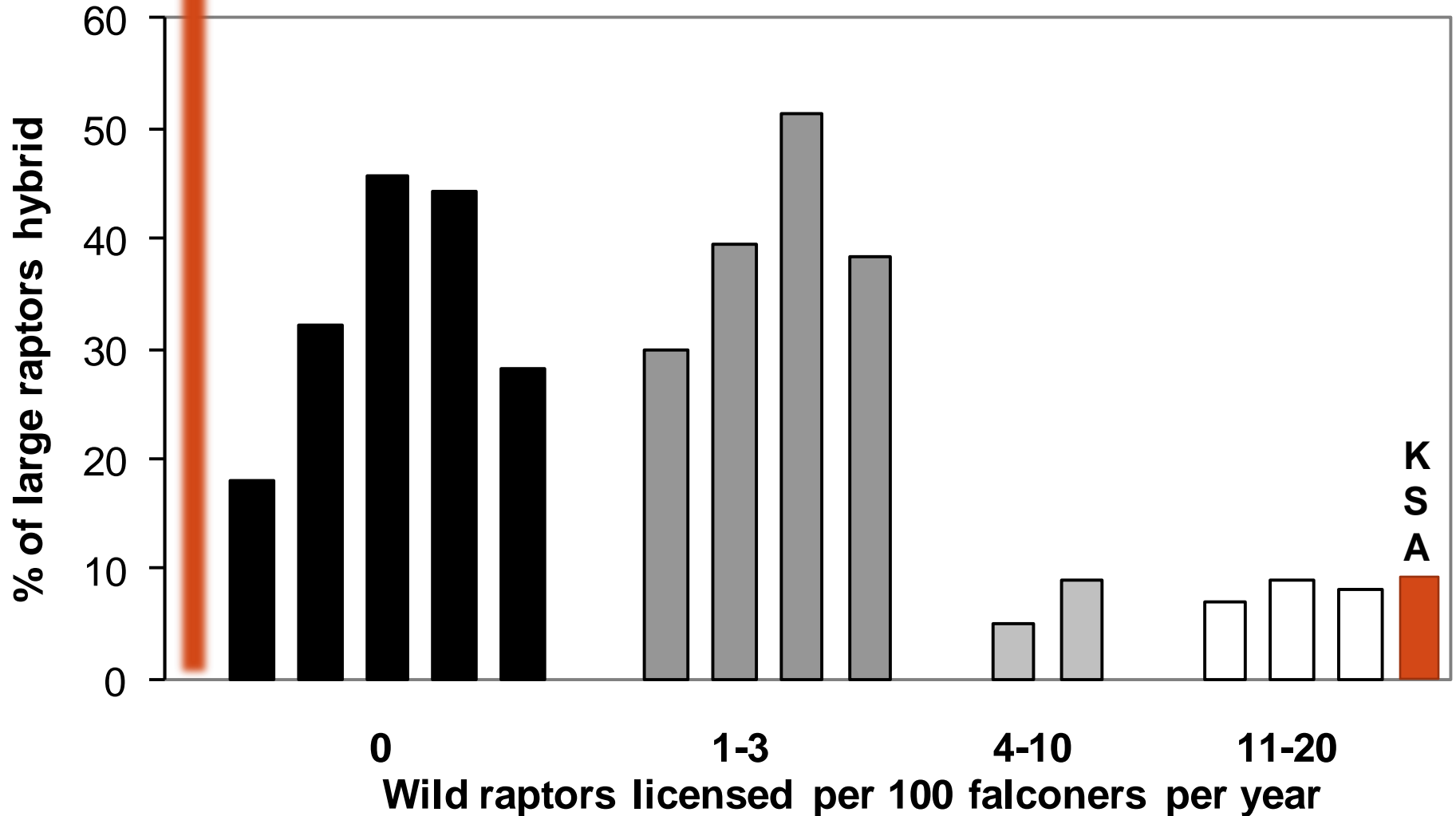
Active falconers at ordinary level were ALL getting birds checked and microchipped by veterinarians.

They knew about conservation issues & thought that solutions included more falconry hospitals (100%), falcon permits (94%), falconry clubs (86%) & also that

- longer healthy falcon life → less demand from wild
- more domestic breeding → less demand from wild

They were not concerned about reducing access to wild birds (NB numbers trapped have increased) and would not have been aware of the IAF data showing that less access to wild raptors → more hybrids

Falconers use few hybrids where they have good access to wild raptors (IAF data 2002)



Moulting facility June 2013: 75% hybrid?



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Mark-recapture for:

1. Harvest rates through trappers & falcon hospitals: in 1990s, thanks to British Trust for Ornithology for rings and to falcon hospitals in the Gulf States for recording transponders, 13 of 171 falcons marked in Kazakhstan during 1993-7 were recorded as trapped. That represents a minimum harvest of 8%.
2. Population sizes from records at veterinary hospitals: Riddle & Remple (1994) estimated that 2,750 falcons were being obtained in the Gulf States annually in the late 1980s. With the 8% harvest rate, these would have represented about 36,000 young, or progeny from 12,000 laying pairs with 3 young/clutch.

Thus, mark-recapture for:

- 1. Harvest rates through trappers & falcon hospitals (as already done for sakers).**
- 2. Population sizes (as now done for goshawks & sakers) provided that catchments known through:**
 - genetics**
 - (stable isotopes)**
 - satellite tracking (sub-population “edges”)**
- 3. Population trends through catch/unit effort.**

Mark-Recapture + Mark-Bank

- 1. Genetics may be no good for defining sub-pops;**
- 2. But give tamper-proof identification of legal birds;**
- 3. Deposit (bank) a feather when bird first marked.**

Marking wild saker, Kazakhstan, 1993



Mark-Recapture + Mark-Bank

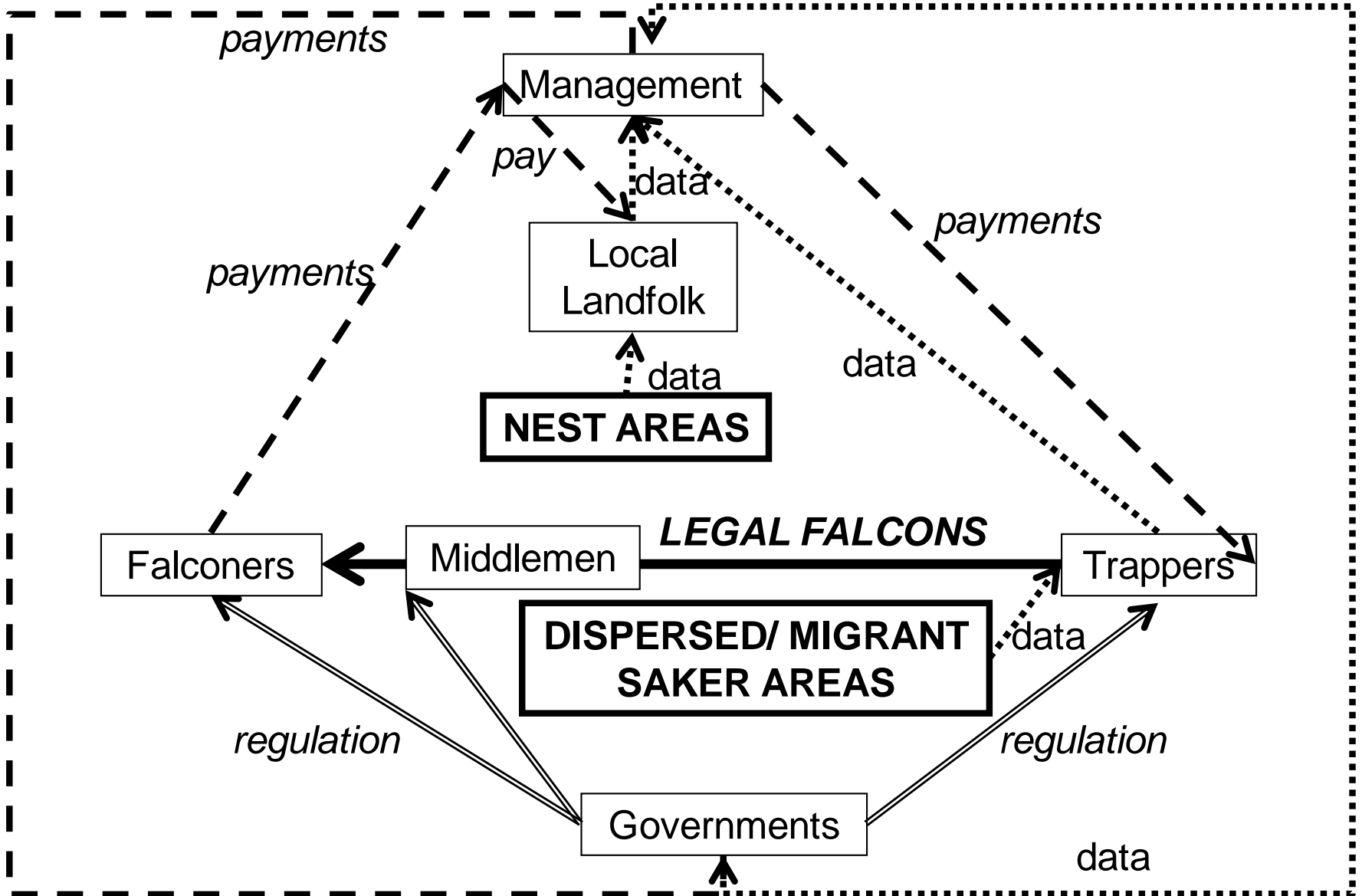
1. Genetics may be no good for defining sub-pops;
2. But give tamper-proof identification of legal birds;
3. Deposit (bank) a feather when bird first marked.
4. Saker Adaptive Management System (SAMS) could combine mark-recapture estimation of populations, for sustainability regulation with mark-bank monitoring of compliance with regulation.

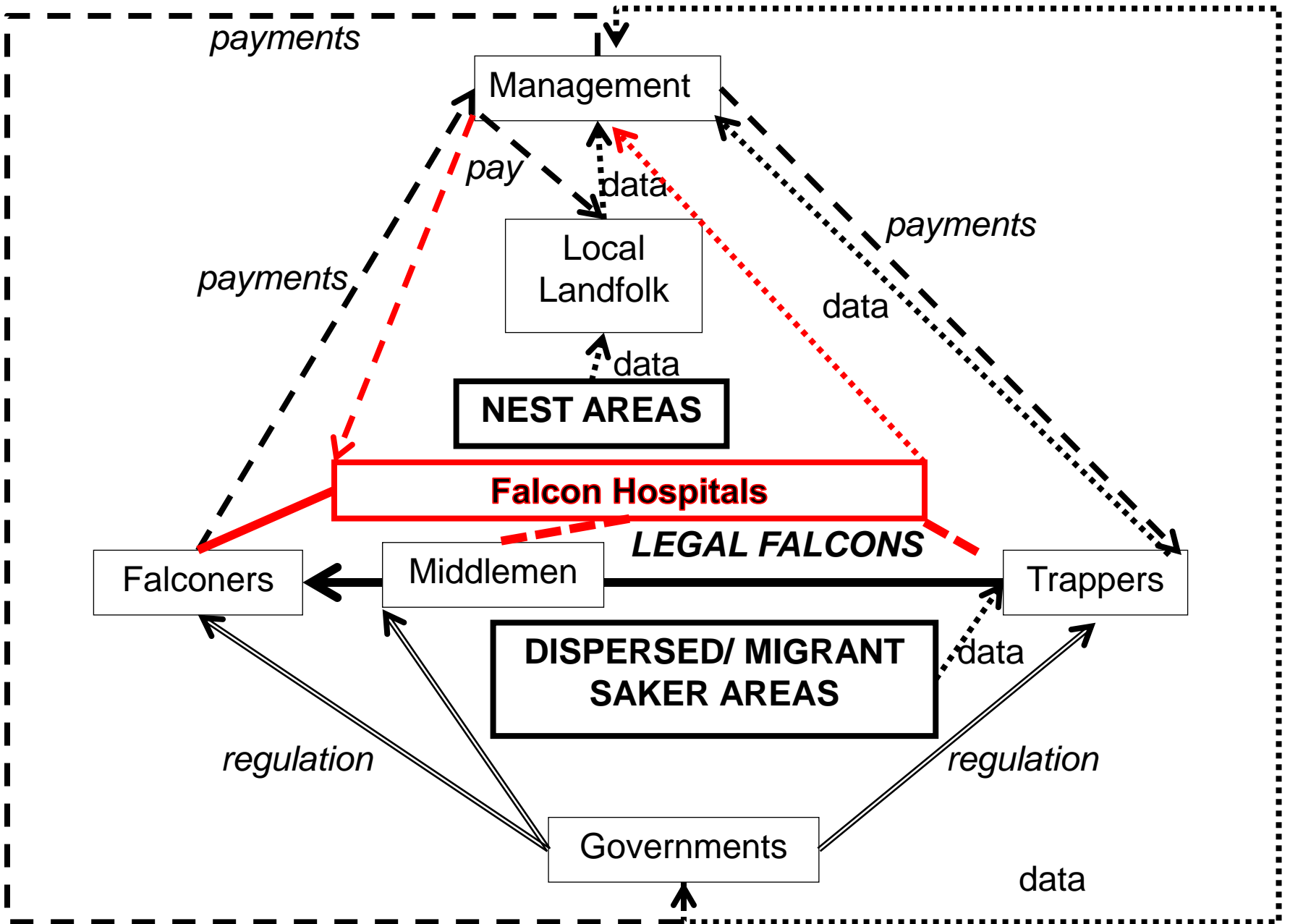
Rewarding:

- local people in breeding areas for marking
- trappers for data on captures and capture effort
- falcon hospitals for their observations

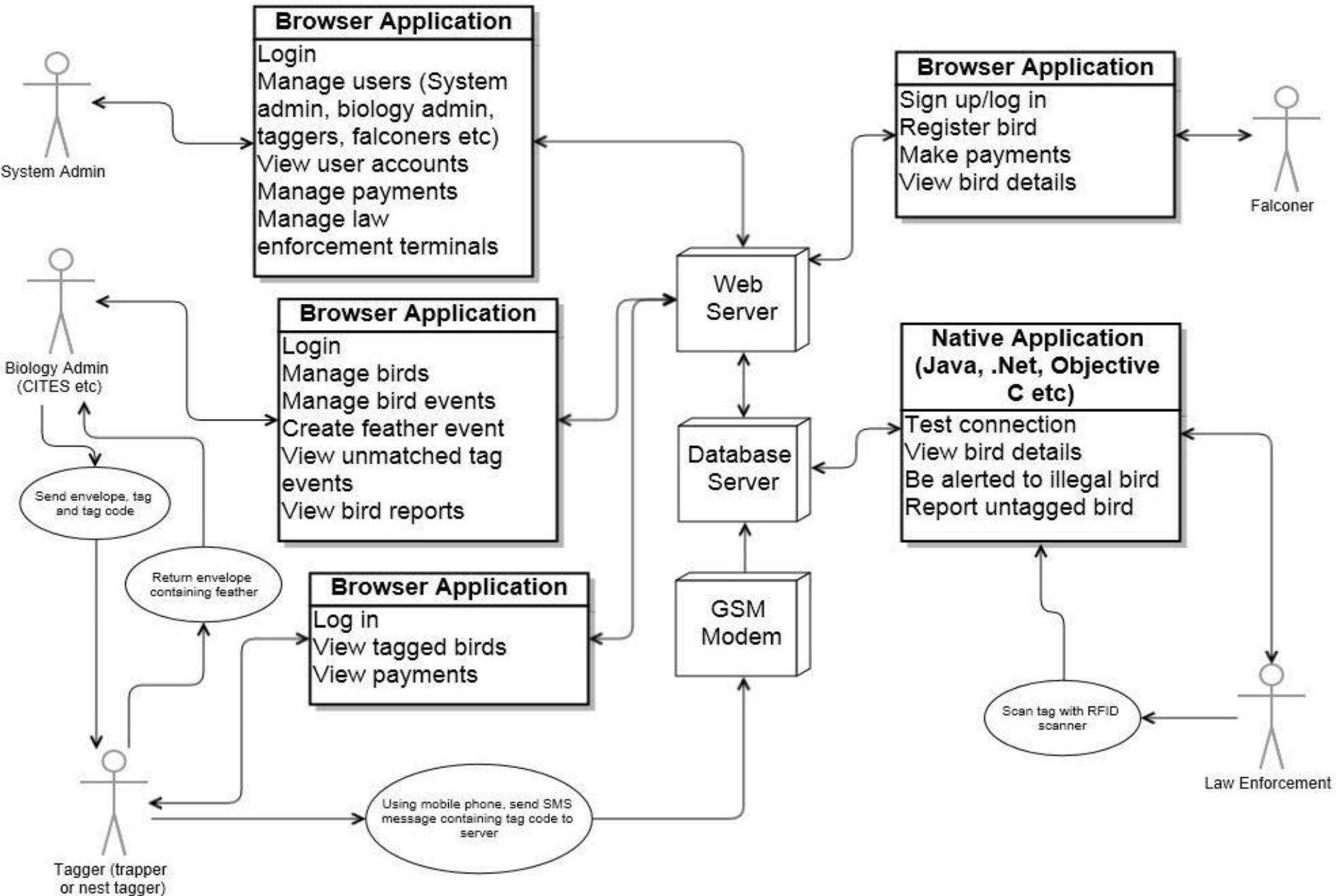
Not just ecological but socio-environmental

Integration – what is missing?





SAMS design (Nick Casey)



SAMS cost – is needed?

Full system costs:

- US\$90,000 for software build (plus hardware)
- Staffing (1.5-2), standardisation ...
- Training, paying, for marking, trapper data, etc.

A cheaper, faster and less bureaucratic alternative is a Trust-Building-Portal, in Arabic, for falconers and trappers, to encourage:

- Use of falcon hospitals to improve bird health
- Providing trapping data to gain rewards/prizes
- Interest in sponsorship of satellite tags
- More conservation work
- Treating people as solutions, not problems

The modelling team has experience building sites that explain simply, to local people, about conserving through use

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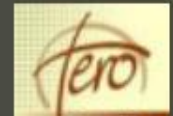
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Naturalliance aims to help everyone whose work or recreation depends on nature. It will build up the knowledge you need, in your own language, for local decisions to manage and restore land, water and wildlife, whilst recording the good work you are doing for nature across Europe.



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Silvicultura o el cultivo de otros árboles para madera/leña/ fibra

La jardinería y la horticultura, incluyendo los huertos y viñedos

La acuicultura o la pesca destinadas a la alimentación

La pesca en ríos, lagos y el mar

La caza y la gestión de la caza

La recolección de productos naturales

Observación y fotografía de la naturaleza

Gestión de reservas naturales y otras áreas de importancia cultural

Cuidado del caballo para el trabajo y el placer

Agricultura: Buenas Prácticas

El Proyecto Allerton

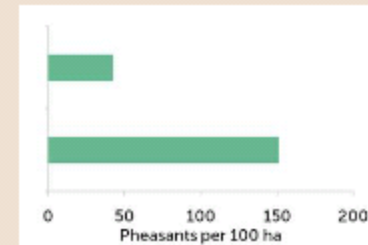
Game & Wildlife Conservation Trust

El Proyecto Allerton se creó en 1992 como una empresa mixta de tierra cultivable y ganadería (280 ovejas) en 333 hectáreas de suelo arcilloso. Los cultivos son principalmente de trigo de invierno y avena (que se venden certificados como "Conservation Grade"), de semillas oleaginosas y legumbres de primavera. La granja es una prueba de la conservación. La contabilidad, incluidos los gastos de conservación, se publica en la revisión anual del "Game and Wildlife Conservation Trust".

Gestión de la Caza y Conservación de Vida Silvestre

Se estableció una situación inicial de referencia relativa a la abundancia de poblaciones cinegéticas y fauna salvaje. La cobertura de anidación, los insectos para la alimentación de los pollos y los alimentos y la cobertura en invierno se incrementaron. Los depredadores de nidos fueron controlados, fue distribuida la alimentación en invierno, pero no hubo liberación de caza de cría.

Todo esto resultó en un efecto positivo en las poblaciones de faisanes



Número de faisanes comunes por cada 100 hectáreas en el otoño antes de la gestión (arriba) y con la gestión del hábitat más montería (abajo).

... with content, of course, in their own languages!

We recommend engaging:

- Networks of local land managers to mark and record productivity in breeding areas
- Falconers and falcon hospitals to record marked birds & fund marking in exchange for information
- Trappers to record all captures, flagging marked birds, in exchange for payment and information
- Governments and international NGOs to support this cooperative approach to Saker management
- More research for long-range reliable radios & genetics to identify falcon origin areas, on real population threats & on Information Technology for 'citizen-science' with hands-on falcon people.

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Abu Dhabi : spring 1993 : who?



Conclusions

- 1. Sakers are resilient unless breeder attrition is enhanced by power-lines, poisoning, trapping;**
- 2. Need to know why European populations are less fecund than in Asia, giving less resilience;**
- 3. Potential win-win with falconers/trappers/hospitals motivates rapid start on a trust-building-portal, in Arabic, for falconers and trappers, to encourage:**
 - Use of falcon hospitals to improve bird health**
 - Providing trapping data to gain rewards/prizes**
 - Interest in sponsorship of satellite tags**
- 4. Maybe test scope for recapture/mark/bank system also with marked European birds in North Africa?**
- 5. Are northern states wise enough to win-win?**

Thank you for listening



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