Measuring populations and managing harvests

1976 Was the year of the first International Falconry Festival.
It was an interesting time for falconry because it was a year after:
1. A journal started in 1970 on Captive Breeding of Diurnal Birds of Prey, by UK falconers and supported by IAF, stopped publishing because it had gathered enough data to show how raptors could be bred.
2. The International Council for Bird Preservation (ICBP, the BirdLife fore-runner) drew back from trying to ban falconry, because such breeding might be a solution for raptor populations decimated by pollutants.

It seemed that falconry was approaching a crossroads, with two viable futures other than a ban (although prohibition remained the aim of some countries). One was for falconers in a country to be licenced as individuals, on condition that they procured raptors responsibly. The second was to register each raptor that was legally obtained, primarily by domestic breeding. As different countries took different routes, they tested what are now called "demand reduction" approaches for reducing trade pressure on wildlife.

Modern 'demand reduction' tends to mean both making supplies illegal and making use unfashionable (think of rhino-horn). However, if rarity makes supplies more valuable, severe pressure on enforcement of legality can lead to ugly situations (think of elephant poaching). One better approach is therefore 'supply substitution', as happened for humans with development of agriculture, followed thousands of years later by domestic breeding of many species that were becoming rare in the wild. However, in other cases the best approach for conserving wildlife may be wild supply enhancement, as that can result in conservation of ecosystems which are important for many other species. As in wild fisheries, that requires the assessment of populations, and often their restoration, followed by management of harvests.

The Convention on Conservation of Migratory Species has accepted this last approach in the Global Action Plan for the Saker Falcon (SakerGAP). This is a wise decision for two reasons. Firstly, although United Arab Emirates (UAE) has discouraged use of wild Sakers and use of domestic bred falcons has been widely adopted by wealthy falconers in the Gulf States, surveys show that a majority of falconers outside UAE prefer wild Sakers. Secondly, problems with power-lines, and potentially with agriculture in steppe ecosystems, can benefit from engagement of falconers to help wild Sakers.

This means that population sizes need to be measured sufficiently accurately to estimate whether they meet the SakerGAP's proposed threshold of 80-100 pairs for a 5% harvest. Saker populations in Europe are monitored quite effectively by BirdLife partners by recording nests. However, in Asia as a whole there is a much lower density of birdwatchers and very poor access to many areas where Sakers breed. Two alternative methods for assessing Saker populations were explored with funding by Abu Dhabi and the International Association for Falconry and Conservation of Birds of Prey in Kazakhstan during 1993-7.

One method was to count Saker nests in sample squares of 100x100 km, and then extrapolate that to the similar areas in the country. This approach assumes similar availability of prey and nest sites across similar areas. Sakers usually require cliffs that are reasonably inaccessible to mammalian predators, or trees in which other raptors have built nests. Although Sakers can also nest on a great variety of human-built structures, large areas of Kazakhstan had few nest sites. Therefore, not only was an area-extrapolation method likely to be unreliable for Sakers, but there could also be much scope for enhancing the population by placement of artificial nests in those areas, as pioneered by Andrew Dixon in Mongolia..

Mark-recapture was the second method tested for assessing Saker populations. Young falcons were marked with micro-transponders (small Radio Frequency Identification Devices) and rings in nests across their distribution, and reports then sought of the RFIDs from falcon hospitals, which scanned each bird for RFIDs because they also used these to identify their patients. Rings too were reported by trappers, but only one in four birds detected by hospitals also had its ring reported, so appreciable numbers of rings were being removed unreported. Nevertheless, the approach worked well enough to estimate the level of

harvest and to know that the wide estimates for the harvested population size included estimated sizes from other methods. Moreover, estimates had been for another raptor, the goshawks, using on one hand the ringing of nestlings followed by trapping in winter and on the other hand area-extrapolation across regions without shortage of nests sites. The two methods gave good agreement, both for the whole of Fennoscandia and on the Baltic island of Gotland (where about 25% of the nests had been found already).

Cooperation between different interests is required to make a mark-recapture system effective. Biologists and local people need to cooperate to mark birds in nests. Trappers and falcon hospitals need to engage with the monitoring system to report birds trapped, especially those with markers. Falconers need to help falcon hospitals distinguish birds from the wild and from domestic breeding. The system is practical, not only because of successful cooperation in the past, but also because of recent favourable response by veterinarians. This coincided with strong interest in the Sakernet I portal by falconers and trappers, who also responded well to survey when encouraged by club organisers and motivated by prizes.

The basic principle is that if (a) 300 young birds are marked in 100 nests, and then (b) 30 of them are recaptured, then the average productivity was 3 young birds per nest, from (a), and the harvest rate was 10%, from (b). Moreover, if the 30 captures of marked birds were among 1200 total captures, then they also estimate a total of 300 x 1200/30 young birds (i.e. 12,000 young birds), which would represent 4,000 nests. A complication for Sakers is the need to obtain adequate samples for estimating populations in different parts of their distribution, where both productivity and recapture rates may differ. Fortunately, tracking by satellite, which has already been started by Mátyás Prommer and Janusz Sielicki to estimate migration routes, can assess catchments initially. Eventually, research on genetic traits or stable-isotopes should help identify origins of trapped falcons. For this and forensic purposes, practitioners need also to agree for small feathers to be banked when birds are marked.

As well as agreeing with practitioners how best to mark Sakers, plans for a monitoring system should also estimate how many young wild falcons need to be marked for estimating sizes of source populations. To show with statistical confidence that a population with 3 young/nest is at least 40% beyond a baseline, would require marking 500 young with a 5% recapture rate, or 250 young if the recapture rate was around 10% (as estimated in the 1990s) but with only the female half of the population harvested. Four years of marking in this way would detect that a population was at least 20% greater than an original estimate.

This RFID-based approach has the advantage that, as well as enabling the monitoring of wild Saker populations and harvests, it is already being used by veterinarians for their own benefit and could relatively easily also provide e-passports to simplify legal movement of raptors between owners and countries, and for quota-based trapping. This would make it simple for enforcers to detect illegally held raptors, while also making procedures easier (i.e. less paper-work), for responsible trappers and falconers. It would deter the illicit while benefitting those within the law.

Professor Robert Kenward, lead in IUCN for Sustainable Use and Management of Ecosystems