

# The application of DNA technology to enforce Raptor Conservation Legislation within Great Britain

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## ABSTRACT

Raptor conservation within Great Britain is underpinned by the primary and secondary legislative controls introduced under the Wildlife and Countryside Act 1981. If kept in captivity, certain bird species are required to be ringed and registered with the Department of the Environment, Transport and the Regions. DNA-based research on certain birds of prey, sponsored by the Department between 1987-1994, led to the development of a range of genetic markers enabling individual raptors to be identified and familial relationships to be established.

In 1995, the Department's Wildlife Inspectorate introduced a programme of blood sampling inspections to obtain material for DNA profiling, which utilised these genetic markers to verify captive breeding claims made by registered keepers of Goshawks *Accipiter gentilis* and Peregrine Falcons *Falco peregrinus*. This paper describes the approach adopted for this innovative method of enforcing raptor conservation legislation, examines the constraints, results and benefits of the inspection programme and considers the implications for raptor keepers and enforcement officers alike.

## BACKGROUND AND LEGISLATIVE FRAMEWORK

In 1979, Member States of the European Union (EU) negotiated the Council Directive on the Conservation of Wild Birds (1979/409/EEC) as a joint formal commitment to maintain European wild bird populations at favourable conservation status. In common with other EU Directives, each Member State is required to implement the 'Birds' Directive' by means of national legislation. Within Great Britain, the Government satisfied this obligation with the introduction of the Wildlife and Countryside Act (WCA) 1981. Part I of this statute deals solely with the protection and conservation of wild birds.

Under section 1 of the WCA 1981, all wild birds, their nests and their eggs are protected from capture, killing, destruction, etc. However, the level of this protection differs between species. For example, most species are protected at all times but game birds may be shot for sport during certain times of the year, and the so-called 'pest' species may be killed throughout the year, providing certain conditions are met.

In addition to this primary protection, section 7 of the WCA 1981 provides a 'secondary' level of regulation and states that: '*If any person keeps or has in his possession or under his control any bird included in Schedule 4 which has not been registered and ringed or marked in accordance with regulations made by the Secretary of State, he shall be guilty of an offence*'. The species listed on Schedule 4 originally included all the diurnal birds of prey (worldwide), plus about 60 native non-raptor species considered to be rare breeding birds in Great Britain.

Additionally, section 7 empowers any person authorised in writing by the Secretary of State to enter and inspect any premises where birds included in Schedule 4 are kept. The Wildlife Inspectorate of the Department of the Environment, Transport and the Regions (DETR), formerly the Department of the Environment (DOE), discharges these inspection responsibilities.

This Inspectorate is managed by a Chief Wildlife Inspector (the first author), with support from one full-time Wildlife Inspector (the second author) and two administrative staff. It consists of a panel of c.70 part-time fee-paid home-based consultants who possess specialist expertise in the identification of species, predominantly birds. Annually, Wildlife Inspectors undertake a total of around 800 visits (both unannounced and by appointment) to the premises of keepers of registered birds and importers/exporters/traders of endangered species.

Section 19 of the WCA 1981 deals with enforcement. It identifies the Police as the statutory enforcement authority for offences created by Part I of the WCA 1981, including those relating to sections 1 and 7.

## BIRD REGISTRATION SCHEME

Established in 1982, the Bird Registration Scheme for Great Britain is administered by the Global Wildlife Division of the DETR, from offices in the city of Bristol. It is a computer-based registration system, operated on similar lines to the scheme administered by the Driver and Vehicle Licencing Agency for motor vehicles. But whereas cars are identified by registration plates, individual birds are fitted with a uniquely-numbered leg-rings issued by the DETR.

In 1993, more than a decade after its introduction, the Bird Registration Scheme was examined as part of the DETR Review of Wildlife Sales and Related Controls. At that time, there were more than 16,000 registered birds (Hansard 1994a). This figure had increased dramatically from an initial estimate of 1,500 birds, for which the scheme had been originally designed. The review team concluded that the scheme had played a valuable role in assisting the maintenance and recovery of wild populations of certain native birds, particularly Britain's three commonest raptors (Common Buzzard *Buteo buteo*, Kestrel *Falco tinnunculus* and Sparrowhawk *Accipiter nisus*). Further, the costs involved in maintaining these secondary controls could not be justified for those species whose wild populations were no longer threatened. Accordingly, the team recommended that the scope of the existing scheme should be reduced by removing the requirement to register a significant number of species of birds, including the three commonest raptors and all non-native birds of prey, except 24 species considered to be threatened globally.

The team also recognised that there was evidence to support claims that an unknown number of birds and their eggs were being taken from the wild illegally, and were then being 'laundered' into the Bird Registration Scheme by unscrupulous keepers making false claims of captive breeding by birds in their care. To combat these activities, it recommended that the resources released by de-registration and other internal re-organisational changes be re-deployed to increase the enforcement of the controls. Moreover, that such efforts should be targeted particularly at those species considered to be most endangered or most at risk from illegal exploitation. One of the main ways proposed to achieve this increased level of enforcement was to expand the use of DNA testing techniques to verify captive breeding claims made by raptor keepers (Hansard 1994b).

Ultimately, the Police are the statutory authority tasked with the investigation and enforcement of offences created by Part I of the WCA 1981. Nevertheless, the DETR closely monitors the Bird Registration Scheme by combining a comprehensive range of administrative checks with programmes of inspections carried out by members of the Wildlife Inspectorate.

## DNA PROFILING IN BIRDS OF PREY

Between 1986 and 1994, the DOE sponsored research at the University of Nottingham to investigate the genetic variation in birds of prey using DNA profiling techniques. Originally, the objective was to ascertain whether it would be possible to identify familial relationships for certain key species, namely Peregrine Falcon, *Falco peregrinus*, Merlin *Falco columbarius*, Goshawk *Accipiter gentilis* and Golden Eagle *Aquila chrysaetos*. These species were chosen because they were considered to be in particular demand by raptor keepers, and there was evidence to suggest that some of the young birds being claimed as captive-bred were in fact being illegally taken from wild nests.

Using the Jeffreys' 33.6 multilocus probe (Jeffreys 1985a & 1985b), the researchers confirmed that variability in the DNA of these, and other raptor species, existed. Moreover, they showed that DNA fingerprinting could be used for both individual recognition and parentage studies (Parkin 1987). Later research focussed on isolating single locus probes from minisatellite sequences, which occur naturally in the chromosomes of birds of prey, but which had been introduced into bacteria in order to mass produce them by means of artificial viral chromosomes known as charomids. Twelve probes were found to detect a single locus in at least one of the four target species. In addition, several of these probes were found to be equally informative when used on closely related species (e.g. other species within the genus *Falco*) (Wetton & Parkin 1994). Copies of these probes have since been transferred by the DETR to the Laboratory of the Government Chemist at Teddington in west London and are now freely available to any laboratory for use in law enforcement.

## BLOOD SAMPLING INSPECTIONS FOR DNA TESTING

In early 1995, as a result of a Ministerial commitment (Hansard 1994b), the authors began work to plan and implement the introduction of DNA technology to check the captive breeding claims made by keepers of registered birds. A total budget of £8,000 was allocated for the task. This amount was calculated to meet all the costs associated with collecting the blood samples (including the fees and travelling expenses for the veterinary surgeons and Wildlife Inspectors) and the DNA analysis costs levied by the laboratory.

### Constraints

A programme of blood sampling inspections was planned which would satisfy the following constraints:

- although DETR Wildlife Inspectors are granted certain powers of entry to premises where registrable birds are kept, the WCA 1981 contains no specific power to take blood samples. Therefore, no unannounced inspections could be undertaken because it would be necessary to obtain the advance co-operation of the registered keeper of each bird to be tested;
- in addition to the co-operation of the individual keepers, it was considered essential to win the support of the Hawk Board. (A national body elected to represent the views of falconers and keepers of diurnal birds of prey and owls);
- in Great Britain, blood sampling is classed as an invasive veterinary procedure by the Veterinary Surgeons Act 1966, and therefore it would be necessary to commission qualified vets to obtain each of the samples;
- although the inspection programme was being devised as a means of monitoring the Bird Registration Scheme, not as part of a forensic investigation, it was considered essential that the samples be collected, stored, transported and analysed using protocols which would meet the rigorous standards required for forensic use. Thus, if potential offences were discovered, the results could be passed to the Police for further investigation and, if necessary, be presented as evidence in court;
- because the success of the programme relied heavily on the co-operation of the registered keepers, in most cases it would be necessary to collect the samples between late September and early February to avoid disturbing birds unnecessarily by catching them up during periods when they would be breeding or moulting.

## Benefits

It became clear that, provided the inspection programme was conducted properly, with due regard to the above constraints and in particular the welfare of the birds themselves, the following benefits could be achieved for those concerned:

- by co-operating with the DETR, legitimate raptor breeders with selected birds in their care could have them DNA profiled free of charge, and would be provided with a written report confirming the results. Broadcasting the fact that their birds had proven to be captive-bred was considered likely to publicly enhance their credibility within the raptor-keeping fraternity, and might also enable them to sell future captive-bred stock more quickly and at a higher market price;
- targeting the sampling effort in favour of family groups of Goshawks would increase the inadequate sample size for this species which had been previously available to the researchers at Nottingham University. This would provide an opportunity to further validate the single locus probes which had been isolated during previous research sponsored by the DETR (Wetton & Parkin 1994).
- the introduction of blood sampling inspections for DNA testing was considered likely to act as a major deterrent against unscrupulous individuals who might otherwise have attempted to launder illegally taken wild birds into the Bird Registration Scheme. Keepers would be unable to predict whether any of the birds in their care would be selected by the DETR for profiling. Moreover, failure to co-operate when selected would immediately arouse suspicion which could lead to details being passed to the Police for further investigation.

For the Phase I programme of blood sampling inspections, it was decided to concentrate on family groups of two species; Peregrine Falcons and Goshawks. These species are highly prized by falconers and austringers alike. Moreover, previous Police action which had utilised DNA technology in this field of wildlife law enforcement revealed that 22% of the combined number of Peregrine Falcons and Goshawks registered with the DOE as captive-bred in 1993 had been taken illegally from wild nests (Guy Shorrocks, Royal Society for the Protection of Birds (RSPB), pers.comm.). To avoid the possibility of reducing the level of the deterrent effect exerted by the introduction of these inspections, the decision to restrict testing to these two species was not disclosed by the authors to anyone else.

## Phase I inspections objectives

In the light of the above, the objectives of this first programme of blood sampling inspections were:

- to undertake a programme of approximately 20 inspections to collect blood samples from a total of *c.*70 birds (*c.*40 Goshawks and *c.*30 Peregrine Falcons), consisting of *c.*20 family groups;
- to actively negotiate to seek the full co-operation of each and every keeper of the birds selected for blood testing;
- to formulate and adopt procedures for the collection, storage, transportation and analysis of the blood samples which would, if required, meet the demanding standards necessary for forensic use;
- to keep total expenditure within a budget of £8,000 and to complete the whole exercise by the end of the 1995/96 financial year (i.e. 4 April 1996);
- on completion of the inspection programme, to provide written reports of the DNA profiling results to each keeper who had participated and to seek to widely publicise the results.

## Preparatory work

On 10 April 1995, the first author wrote to each and every keeper of the *c.* 4,000 birds registered in captivity in Great Britain at that time, advising them of the Department's intention to introduce a programme of blood sampling inspections for DNA testing to verify captive breeding claims. Making this announcement at the beginning of the breeding season was considered to possess the potential

to deter some individuals who might otherwise have chosen to make false captive breeding claims. Consequently, this reduction in demand for illegally taken stock should decrease the number of nests of wild raptors plundered by robbers.

Following a period of intensive research and investigation, involving consultations with personnel at the Forensic Science Service (FSS), selected veterinary surgeons who specialised in avian medicine, and medical equipment suppliers, a unique blood sampling kit was devised and produced for the task. Each kit contained all the equipment that would be required by the veterinary surgeon to obtain a blood sample from a single bird, as follows:

pre-injection swab; 2 x disposable needles (23G x 25mm long); 2 x disposable needles (25G x 16mm long); 2 x 2ml disposable syringes; 2 x 2.5ml EDTA plastic sealable blood sample tubes; 2 x cotton buds in 'minigrip' plastic bag; 1 pair of latex gloves; and 1 x 'tamper-proof' plastic evidence bag (140mm x 215mm).

Detailed letters were drafted to provide comprehensive advice and guidance for each registered keeper and their chosen veterinary surgeon. In addition, an instruction letter and report form was designed, for use by the Wildlife Inspector who was selected to witness each sampling procedure. Further, a three-sheet carbonised declaration form was specially produced to enable the veterinary surgeon to formally record details of each bird sampled and the identification details marked on each corresponding EDTA tube.

The DETR commissioned the FSS to undertake a two-day Quality Assurance audit of the selected DNA analysis laboratory, namely, the Department of Genetics at the University of Nottingham. Overall the report was favourable, and it acknowledged the high standard of expertise of the two main scientists involved. However, a number of recommendations emerged from the audit concerning the security arrangements in place at the laboratory, and some relatively minor criticisms of their documentation procedures. Accordingly, these recommendations were implemented by the University before any of the blood sampling inspections were carried out.

Prolonged negotiations with colleagues in the Home Office and within the DETR's Legal Directorate, proved necessary to secure approval that the planned inspection programme could be undertaken without the need to follow the lengthy licencing procedures required under the Animals (Scientific Procedures) Act 1986.

The full support of the Hawk Board was secured by consulting key members throughout the planning process, augmented by regular attendance at their quarterly meetings in order to present outline proposals for the inspection programme, in advance of any visits taking place.

Eventually, when the extensive preparatory work had been completed and finalised, a single pilot inspection was carried out by the second author to confirm that the proposed procedures were practical, and that they would operate efficiently.

Additionally, at the Department's annual training seminar for Wildlife Inspectors held in November 1995, this new type of inspection was introduced to the panel of consultant Inspectors by means of two workshop sessions. This strategy provided two major benefits: a) it allowed for the direct dissemination of detailed practical advice and guidance to the people who would be responsible for ensuring that the inspection procedures were correctly followed; and, b) it provided an opportunity for initial feedback to be obtained from the Inspectors themselves. As a result of these workshops, minor modifications were incorporated into the final inspection procedures.

## APPROACH

Analysis of the DETR's comprehensive computer records dating back to 1987 allowed appropriate family groups of the two target species to be selected. It was considered important to inspect the breeders of the two key species because these were the individuals who, as part of the standard registration process, had been required to make written and signed declarations concerning the origins of their captive-bred stock. In order to optimise the number of inspections required to meet the stated objectives, the decision was taken to bias the selection of keepers towards those who were in possession of at least two or three related birds at the time the inspections were allocated.

In December 1995, letters were despatched to the keepers of the targeted birds seeking their co-operation and enclosing another letter containing instructions for their veterinary surgeon. To minimise inconvenience to keepers, the latter letter requested that the Department be invoiced directly for the fees incurred by the vet. Within 14 days, each keeper was contacted by telephone to arrange an appropriate appointment for a Wildlife Inspector to visit their premises to witness the blood sampling procedure. Keepers were expected to make contact with their chosen veterinary surgeon to check that they were content to undertake the necessary procedures, and to confirm their availability at the appropriate date and time. Once these arrangements had been agreed, a suitably qualified Wildlife Inspector was selected by the DETR. Telephone contact was made to confirm their availability to carry out the inspection. If unavailable, another Inspector was chosen. Next, a written inspection request, including detailed instructions and an appropriate number of sampling kits, was despatched to the Wildlife Inspector.

On the chosen day, the Inspector was required to attend the premises at the agreed time to deliver the sampling kits to the veterinary surgeon and to witness the blood being taken from each target bird. Keepers were asked to be wholly responsible for the catching and handling of the birds because Wildlife Inspectors have no statutory authority to undertake these procedures. To minimise the stress inflicted upon the birds, particularly those housed in aviaries (as opposed to falconry-trained birds kept tethered to blocks or bow perches), most keepers chose to catch them up immediately prior to the sampling procedure and then replace them in their aviaries straightaway afterwards. However, a small number of keepers preferred to catch the birds prior to the appointment and retain them in boxes, thus reducing the pressure on themselves of catching birds whilst the vet and Inspector were waiting (and watching too!).

In the guidance notes, the Department recommended that 1ml of blood be taken from the brachial vein at an appropriate location on the ventral surface of the bird's wing. The vet could then divide the sample into equal parts by carefully injecting the blood into two separate EDTA tubes. One tube was to be sent to the laboratory for the DNA analysis, and the other retained and stored by the registered keeper of the bird. Should the analysis results lead to a dispute between the keeper and the DETR, the stored sample could be made available for additional independent DNA analysis.

The Wildlife Inspector was required to label each specimen tube with the inspection reference number, a sample reference number and a consecutive exhibit number, the latter being unique to the veterinary surgeon involved. To ensure confidentiality for the keeper and the anonymity of the specimen tube received by the laboratory, no leg-ring numbers or personal identification information relating to the keeper were included on the label.

When the labelling had been completed, and the accuracy of the details confirmed with both the keeper and the vet, the Inspector was required to write his/her initials and the date on each EDTA tube. One tube of blood relating to each of the birds was then selected by the keeper for retention. The remaining tubes were wrapped in cotton wool and sealed inside in the special 'tamper-proof' plastic evidence bag by the Inspector. This bag was packed with additional padding, placed in a cardboard box and the whole package was then sealed inside a standard Royal Mail Registered Delivery envelope. This whole procedure was witnessed by the keeper who was then invited to sign across the final seal.

One sheet, of the special three-sheet carbonised sampling declaration form signed by the vet, was passed to the keeper, one copy was retained by the vet and the top copy was kept by the Inspector for return to the Department. On leaving the premises, the Inspector was required to go immediately to a Post Office and to send the package to the laboratory, not forgetting to obtain a 'Certificate of Posting' receipt for continuity of evidence purposes. Finally, an inspection report form was completed by the Inspector and submitted to the Department, attaching the vet's declaration form and the Certificate of Posting.

## RESULTS

The extensive background research and preparatory work proved to have been a worthwhile use of time and resources because the procedures adopted worked remarkably well. No major or

insurmountable problems were encountered. Minor difficulties included, for example, two of the keepers' local veterinary surgeons declining to participate because they did not feel confident or experienced enough to take blood samples from raptors. However, in both cases other vets were found who willingly carried out the task.

Despite concerns expressed by a few keepers at the outset of the inspection programme, no birds sustained injuries or died as a result of the blood sampling inspections. However, towards the end of the sampling period, two keepers who were originally selected declined to participate because they were concerned that, in the event of injury or death occurring to a bird as a direct result of the blood sampling procedure, the Department was not prepared to accept liability and to pay appropriate compensation. It was pointed out that, by agreeing to co-operate with the DETR, keepers were effectively forfeiting their ability to claim recompense should something go wrong. The Hawk Board supported this interpretation as sound and reasonable, a view which was subsequently shared by DETR's Legal Directorate.

Accordingly, the authors undertook further negotiations within the Department and eventually obtained Ministerial agreement to the effect that, *'providing certain reasonable conditions have been met by keepers, the DOE will accept financial liability in the unlikely event of injury or death occurring to a bird, where it can be shown to have been caused as a direct result of a blood sampling inspection commissioned by the Wildlife Inspectorate'*. This policy was not finalised until mid June 1996, after the completion of the 1995/96 Phase I inspection programme. However, once the liability issue had been addressed, both keepers agreed to participate in Phase II of the blood sampling inspection programme which was scheduled to begin in November 1996.

The inspection programme was completed within the agreed deadline and the final total expenditure was £8,032. The results are summarised below:

**Table 1. Results of the DETR's 1995/96 programme of blood sampling inspections**

| <i>BIRDS/INSPECTIONS</i>                              | <i>Goshawk</i>        | <i>Peregrine Falcon</i> | <i>Total</i>          |
|-------------------------------------------------------|-----------------------|-------------------------|-----------------------|
| Number of birds sampled<br>(ad=adults; o/s=offspring) | 32<br>(ad=18; o/s=14) | 35<br>(ad=18; o/s=17)   | 67<br>(ad=36; o/s=31) |
| Number of family groups                               | 10                    | 9                       | 19                    |
| Number of keepers inspected                           | 9                     | 8                       | 17                    |
| Number of inspections                                 | 9                     | 8                       | 17                    |

The final report received from the scientists at Nottingham University showed that the Peregrine Falcon samples were subjected to DNA profiling analysis using a battery of eight single locus probes (four of these probes had originally been isolated from the DNA of Peregrine Falcons, two from Merlin DNA and one from Kestrel DNA). The Goshawk samples were profiled with a series of five single locus probes (four originally derived from Red Kite *Milvus milvus* DNA and one from Golden Eagle DNA). No mutations or incompatibilities were observed. Therefore, these results effectively verified the captive breeding claims made by each registered keeper and confirmed that all those offspring tested had been bred in captivity.

In addition to writing to each of the registered keepers who had participated to notify them of the results and to thank them for their co-operation, a DETR Press Release was issued in which Environment Minister James Clappison was quoted as saying: *'...These inspections provide two major benefits: first, they enable genuine bird keepers to substantiate their captive breeding claims unequivocally; and secondly, I believe they act as a major deterrent against the small number of unscrupulous keepers who may otherwise attempt to launder illegally taken wild birds into captivity. The success of this programme of inspections highlights the value of DNA testing techniques...'* (DOE 1996).

## DISCUSSION

Due to the existing situation where the Department lacks the appropriate powers to undertake unannounced blood sampling inspections, it is perhaps not surprising that all the offspring proved to have been bred in captivity. The DETR is currently exploring the possibility of amending the legislation to rectify this perceived weakness in the WCA 1981.

Although it is impossible to quantify the actual impact that this programme of inspections exerted upon those keepers who might otherwise have been tempted to make false breeding claims, the Department received widespread public support from the Police; RSPB; Royal Society for the Prevention of Cruelty to Animals (RSPCA); the Hawk Board; and the vast majority of raptor keepers. Nonetheless, these inspections should be viewed as part of a two-pronged strategy, which also includes the application of DNA technology during intelligence-led investigations undertaken by the Police.

The numbers of Peregrine Falcons and Goshawks claimed to have been captive-bred and registered with the DETR annually since 1990 are detailed in Table 2.

**Table 2: Numbers of captive-bred raptors registered with the DETR**

| <i>SPECIES/YEAR</i>           | <i>1990</i> | <i>1991</i> | <i>1992</i> | <i>1993</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Peregrine Falcon <sup>1</sup> | 269         | 319         | 290         | 360         | 286         | 318         | 436         |
| Goshawk                       | 79          | 155         | 141         | 154         | 118         | 141         | 140         |
| <b>Total</b>                  | <b>348</b>  | <b>474</b>  | <b>431</b>  | <b>514</b>  | <b>404</b>  | <b>459</b>  | <b>576</b>  |

Notes:<sup>1</sup> The totals for this species include Peregrine Falcon hybrids.

In Great Britain, DNA technology was first employed as a forensic tool as part of a wildlife law enforcement investigation to refute a raptor keeper's claims, relating to four Goshawks he alleged had been bred in captivity in 1991. Although the court case was not heard until October 1992, the Police investigation generated an immense amount of publicity which began soon after the search warrant was executed in June 1991. It can be argued that the deterrent effect generated by the high profile use of DNA technology in this case was responsible for a significant proportion of the c.10% drop in production of both Peregrine Falcon and Goshawks in 1992, compared with the 1991 breeding season. However, other factors may have contributed to this decline (e.g. weather conditions, changes in the number of breeding pairs, etc.)

In October 1992, captive-bred Goshawks were being freely advertised for sale in specialist national newspapers and magazines for between £650 and £850 each. So although that initial court case resulted in the falconer being successfully convicted, the £200 penalty imposed was clearly derisory. In effect, the message which circulated within the raptor-keeping fraternity following this conviction was that a potential offender would simply plan to take an extra bird from the wild to 'budget' for the possibility of being caught and prosecuted.

During 1993 and early 1994, with encouragement and practical assistance provided by the DETR and RSPB, the Police undertook a series of major investigations involving several raptor keepers who had claimed to have been captive breeding Peregrine Falcons and Goshawks. Blood samples were taken from more than 100 birds and DNA analysis was used to test each keeper's declarations. The results showed that 36 Peregrine Falcons (10% of the total 'captive-bred' young registered with the Department in 1993) and 18 Goshawks (almost 12% of those claimed as captive-bred in 1993) were not related to their alleged parents (Guy Shorrock, RSPB, pers.comm). It seems reasonable, therefore, to conclude that these high profile Police operations were largely responsible for the significant reduction in the number of 'captive-bred' birds of these two species registered with the DETR in 1994. Table 2 shows that, compared with the 1993 figures, the number of 'captive-bred' Goshawks registered in 1994 fell by more than 23%, and those of Peregrine Falcons fell by more than 20% (a combined total of more than 21%).

Seven men were subsequently prosecuted under the WCA in 1981, each case resulting in a conviction. The fines ranged from £522, imposed against a keeper who was shown to be in possession of a single illegal Goshawk, to £10,500 (reduced to £2,000 on appeal), exacted upon a breeder who was shown to be in illegal possession of 13 Goshawks and 2 Peregrine Falcons.

Two further cases, which followed on from these investigations and involved large-scale independent breeder/dealers of Peregrine Falcons, were heard at Crown Courts in Northumberland and Essex during May 1995 and September 1995, respectively. Rather than prosecute these two individuals for offences under the WCA 1981 (which does not currently provide for the imposition of custodial sentences), the Crown Prosecution Service chose to charge the men for being in possession of illegally-acquired Peregrine Falcons for the purpose of sale, under Regulations 3 and 8 of the Control of Trade in Endangered Species (Enforcement) Regulations 1985 (Statutory Instrument 1985/1155). These Regulations implemented the original European CITES Regulation (EEC/3626/82). Both defendants were found guilty and imprisoned, one for 18 months and the other for 4 months. In addition, a total of 35 Peregrine Falcons were subject to forfeiture.

In summary, the utilisation of modern DNA technology via programmes of blood sampling inspections implemented by the DETR, combined with carefully targeted intelligence-led Police investigations, is considered to act as a powerful deterrent against potential offenders who might otherwise attempt to launder illegally-obtained birds into the captive raptor population in Great Britain. The application of such technology has also proved to be an effective means of enforcing the controls imposed by the Bird Registration Scheme, for the benefit of wild raptor populations. Clearly, there is real potential for similar techniques to be adopted within conservation strategies for the benefit of other threatened taxa (e.g. psittacines).

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