

**SUMMARY OF THE
MONITORING OF PISCIVOROUS BIRD
LICENCES**

2001-2002 SEASON

**Rural Development Service
DEFRA**

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SUMMARY OF RURAL DEVELOPMENT SERVICE (RDS) MONITORING OF PISCIVOROUS BIRD LICENCES ISSUED THROUGHOUT ENGLAND IN 2001-2002

1.0 INTRODUCTION

- 1.1 This report provides a summary of the monitoring undertaken by the Rural Development Service (RDS) of the Department for Environment, Food & Rural Affairs (DEFRA), for licences issued in England to shoot piscivorous birds as an aid to the protection of inland fisheries. The licences issued for the 2001-2002 'season' (May to April) cover Cormorants *Phalacrocorax carbo*, Grey Herons, *Ardea cinerea* and Goosanders, *Mergus merganser*. No licences to shoot Red-breasted Mergansers, *Mergus serrator*, were issued during this period in England.
- 1.2 The primary objective of the monitoring was to gather information on the effects of licensed shooting and other fishery protection measures. Visits were usually made to coincide with the collection of bird carcasses for stomach contents analysis. It should be stressed that this programme is not designed to be a rigorous, scientific R&D exercise. A separate programme of scientific research was commissioned by the former Ministry of Agriculture, Fisheries & Food (MAFF), the Department of Environment, Transport & the Regions (DETR) and the Environment Agency (EA).
- 1.3 The report outlines the methods used to acquire and assimilate the data. Results for licensing are presented in various forms with comments on each section. Results of stomach contents analysis undertaken by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) are also reported. CEFAS is an Executive Agency of DEFRA.

2.0 METHODOLOGY

- 2.1 Information was obtained from site visits to fisheries when licensees and others involved with the individual fishery were interviewed and their views recorded. Where possible, observations were made of the implementation of licensed shooting and the use of other protection measures. Piscivorous bird numbers and their activities in and around the area were also noted.

- 2.2 Where cases involved still water fisheries, the RDS Wildlife Adviser typically made one or two monitoring visits during the licence period. Wherever possible, these were timed to coincide with peaks when the fishery was under the greatest potential threat from piscivorous birds. Exceptionally, where the situation demanded, additional visits were made. In cases involving river situations, contact was made on a monthly basis during the licence period.
- 2.3 Contact with licensees was also maintained by telephone; in some cases, interim records and results, which included details of bird impact and numbers, scaring measures and the results of such efforts, were produced in written form and forwarded to Advisers.

3.0 RESULTS AND DISCUSSION – LICENCE EVALUATION

Figures for licensed shooting and non-lethal anti-predation measures are presented within the Appendices A - K.

3.1 Details of Licences Issued

3.1.1 *Bird species licensed* (Appendix A)

During the 2001-2002 (May to April) season, 111 licences were issued throughout England to permit the shooting of piscivorous birds as a means of reinforcing the scaring effort at inland fisheries. Ninety-four (85%) were issued for Cormorants, 16 (14%) for Grey Herons and 1 (1%) for Goosanders. No licences were issued for Red-breasted Mergansers.

3.1.2 *Types of fishery licensed* (Appendix A)

For Cormorants, still water fisheries (including ponds, lakes, reservoirs and fish farms) accounted for 74% (70) of licences, with the remaining 26% (24) issued for rivers. For Grey Herons, 56% (9) were issued for still water fisheries and 44% (7) for rivers. One licence was issued to shoot Goosanders on a still water.

3.1.3 *Shooting details* (Appendix B)

The number of birds permitted to be shot under these licences amounted to 618, comprising 545 (88%) Cormorants, 68 (11%) Grey Herons and 5 (1%) Goosanders. Of this allocation, 254 (41%) birds were shot - 225 Cormorants, 28 Grey Herons and 1 Goosander. Last year, 48% of birds licensed to be shot, were shot. Of the birds shot under licence, 229 (201 Cormorants, 27 Grey Herons and 1 Goosander) were retrieved and sent to CEFAS for

stomach contents analysis. The most common reason for birds not being retrieved was the inability of fishery staff to access birds that fell into water bodies after being shot. For 34 licences (27 Cormorant and 7 Grey Heron), no birds were shot.

3.1.4 **Geographical distribution of licences**

For all three bird species, the geographical distribution of licences (still water & river) throughout DEFRA's eight Government Office Regions, is presented in Appendices C, D & E.

Cormorant licences were issued within all regions, with the highest proportion issued in the South East (39%). Seventeen percent and 16% were issued in the North West and South West respectively. Although still water licences were issued throughout all regions, river licences were confined to the South East (50%), the South West (37%) and the West Midlands (13%).

For Grey Herons, licences were issued within only 4 regions; with 81% in the South East. All river licences were confined to the South East.

Only 1 licence was issued for Goosanders on a still water in the North East.

3.2 **Evaluation of Licensed Shooting (Appendix F)**

Licensed shooting cannot and should not be planned in advance as it is stressed to licensees that the shooting of birds as part of the scaring programme should only be undertaken when the situation demands; for example, if the effects of other measures begin to wane and the number of birds predating on the fishery increases. This inevitably means that RDS monitoring visits are *unlikely* to coincide with specific shooting action, hence the lack of first hand information and experience.

3.2.1 **Still Water Fisheries**

(i) View of Licensee

In 48 cases involving Cormorants, the licensee considered that the shooting of a limited number of birds under licence had helped to protect the fishery from predation. A similar assessment was made in respect of 4 Grey Heron cases and 1 Goosander. No opinions could be expressed in 21 Cormorant and 4 Grey Heron licences, as no birds were shot. In 1 Cormorant case, the licensee considered the licence to be ineffective and expressed the need for a cull. In 1 Grey Heron case, the licensee considered licensed shooting to be ineffective as he was only permitted to shoot 10 birds out of the 250 that were on site.

(ii) View of RDS Wildlife Adviser

In 49 cases involving Cormorants, the Adviser formed the opinion that licensed shooting had been partly effective in protecting the fishery from predation. The same applied to 5 Grey Heron cases and 1 Goosander. As it is unlikely that Advisers will witness shooting activities, this assessment is usually based on information provided by the licensee or others. However, in 1 Cormorant and 1 Grey Heron case, Advisers disagreed with the licensees' opinion. With respect to the Cormorant case, the Adviser indicated that although only short-term success appeared to have been achieved by licensed shooting, the overall numbers of Cormorants utilising the site was less than the previous year and suggested that some longer-term effect could have resulted. In the Grey Heron case, the Adviser considered licensed shooting to be relatively effective in that it caused the birds to congregate in one area rather than being distributed throughout the entire fishery.

3.2.2 River Fisheries

(i) View of Licensee

In respect of the shooting of Cormorants in river situations, 18 licensees were of the opinion that such action had been partly effective in all cases. This also applied to 4 Grey Heron cases. No birds were shot in 6 Cormorant cases and 3 Grey Heron. No licensees consider the issue of a river licence to be ineffective.

(ii) View of RDS Wildlife Adviser

Advisers expressed a similar opinion that licensed shooting was partly effective in 18 Cormorant and 4 Grey Heron cases. As it is unlikely that Advisers will witness shooting activities, this assessment is usually based on information provided by the licensee or others.

3.2.3 The Role of Licensed Shooting in Fishery Protection

Ways in which licensed shooting had helped to protect fisheries from piscivorous bird damage were expressed by licensees and included the following:

- birds left the area of the fishery at the time of shooting.
- ability to remove persistent birds.
- reduction in the number of birds that subsequently returned to the fishery.
- significant reduction in time spent by birds at the fishery, even though overall bird numbers were not influenced.
- birds became wary and therefore more responsive to scaring measures.

- birds were easier to scare and more difficult to shoot, mainly because they remained out of shot gun range.
- birds were more wary at landing directly on water bodies and associated banks.
- reduction in losses or damage was recorded.

3.2.4 *Reasons for not Utilising Licences*

There were a number of reasons stated why no birds were shot in a total of 34 cases. These included:

- effectiveness of non-lethal scaring measures removed the need to shoot birds.
- birds made wary by non-lethal scaring measures, remained out of shotgun range.
- number of birds frequenting the fishery declined significantly during the licence period.
- birds provided with a more secure refuge to roost and feed due to neighbouring fishery ceasing trout rearing and therefore not applying for a licence i.e. no disturbance.
- licensed shooting was discontinued as Grey Herons nested early on-site.

3.2.5 *Adverse Public Reaction to Licensed Shooting*

There were only 2 cases this season where complaints were received in relation to the shooting of Cormorants. The first involved several complaints from members of the public that shooting was taking place from a footpath. When investigated, it transpired that there was no public access to the fishery. The Police and the DEFRA's RDS Wildlife Administration Unit became involved in a second case when a member of the public suggested that the fishery were shooting more birds than the licence permitted. No further action was taken once it had been established that this was not the case.

3.3 *Details of Non-Lethal Anti-Predation Measures Employed*

This section refers to any non-lethal measures which were employed in order to protect still water and river fisheries from piscivorous bird predation. More than one approach or method was employed at each site and these were classified under 4 categories: (i) Scaring, (ii) Proofing & Exclusion, (iii) Habitat Modification & (iv) Stocking Regime.

3.3.1 **Scaring** (*Appendix G*)

Human disturbance on sites was the most significant element in the scaring regime and was exercised by all licensees. In conjunction with this, the most commonly used method was shooting to scare with shotguns (exercised in 95% of cases). Other scaring devices such as rockets, gas guns/crow bangers and pyrotechnics were used in 22%, 17% and 11% of cases respectively and served to reinforce the deterrent effect of human presence and form the basis of most scaring programmes.

Human mimics i.e. scarecrows with moving parts (items attached to blow in the wind) were utilised in 22% of cases and found to be particularly effective when moved around the fishery on a regular basis and reinforced with shooting to scare. The use of other static visual or audible scarers such as car or air horns, rotating reflectors, flags and kites was limited. This was due mainly to their use being considered beneficial only on small water bodies such as ponds, fish farms or where there are focal points of piscivorous bird interest, including cages located within large water bodies (e.g. reservoirs) and where islands or other structures are used as roost sites.

The fact that commercially available devices are generally designed to scare birds from agricultural and horticultural crops is also relevant and this is a significant factor in their limited benefit and application to fishery situations. Examples include the impracticalities of using gas bangers to protect large areas of water and the difficulties of effectively deploying visual scaring devices in such situations.

The most commonly used combination of techniques in river situations was human disturbance (100%) and reinforcement by the firing of shotgun cartridges or blanks (97%). Static noise generating or visual scarers such as rockets, gas guns/crow bangers, flags/plastic bags, predator mimics and kites/rotating scarers were employed collectively in only 22% of river licences. Human mimics were only established in 32%. This reflects the unsuitability and ineffectiveness of these types of scarers in the river situation where mobility and flexibility of approach is required in order to protect long narrow stretches of vulnerable water.

3.3.2 **Proofing & Exclusion** (*Appendix H*)

Despite being an extremely costly method of deterring piscivorous birds from inland fisheries, a few licensees (10%) erected netting over ponds and fish farms. Although effective in the majority of cases, one licensee indicated that herons had developed a means of gaining access to the fish farm through the mesh. The method of erecting tape or wires across rearing pools and fencing the water's edge to deter piscivorous birds was only utilised in 7% and 3% of cases respectively. Licensees usually found that the birds rapidly habituated to this technique.

It is generally impractical to exclude birds from large water bodies and rivers, and on rod and line fisheries, proofing would interfere with fishing activities. This was reflected by the fact that proofing techniques were implemented in only 2 river licences.

3.3.3 **Habitat Modification** (Appendix I)

The use of fish refuges was restricted to still water fisheries with 16% of sites establishing them. The effectiveness of this technique was extremely varied and it has been suggested that in some situations, fish refuges can in fact exacerbate the level of damage experienced as it attracts the fish and therefore the birds to that specific area. Managers of river fisheries preferred to manage the growth of weed such as *Ranunculus sp.* to provide natural cover for fish. Weed cutting was practised in 32% of all river fisheries.

Bank vegetation management was the most common form of habitat modification, with 10 river and 11 still water fisheries (19% of all cases) implementing it. The majority of this management was directed at deterring Grey Herons from fishing along the bank side. Techniques included the planting of scrub species to act as natural barriers or allowing the branches of trees to overhang riverbanks to render the habitat incompatible with a quick escape route.

Roost removal was exercised in the least number of cases (4%). This was a reflection of the difficulty involved in gaining access to facilitate the felling and removal of such trees. Furthermore, the removal of roost trees is generally undesirable or not permitted due to their conservation or amenity value.

3.3.4 **Stocking Regime** (Appendix J)

Increasing stocking rates is generally viewed as being prohibitively expensive and was not exercised at any fishery during this season. However, stocking with larger trout is now being more widely used at put-and-take fisheries as a possible means of limiting predation and was undertaken in 30% of still water situations. Reports from licensees, however, indicate that birds, particularly cormorants, are opportunistic in their approach and will still attempt to catch these larger fish even though they could never swallow them. For this reason, damage to the fish usually occurs which can render them susceptible to infections and less acceptable to fishermen.

By delaying the timing of stocking to avoid periods when cormorant numbers are at their highest and the fishery at its most vulnerable, 26% of still water fisheries found that they could limit the level of damage sustained.

Although it is generally accepted that cyprinid fish are slower than salmonids, no game fisheries were found to stock alternative prey species in an attempt to deflect piscivorous bird predation.

3.4 **Evaluation of Non-Lethal Anti-Predation Measures** (*Appendix K*)

The basis for assessing the effectiveness of non-lethal measures relied primarily on information provided by the licensee. For the reasons stated, it was usually not possible for Advisers to be in attendance sufficiently often, or for long enough periods, to make judgements based on their own observations. In addition, this assessment needs to be considered in conjunction with the benefits gained from licensed shooting contributing to the overall scaring programme.

3.4.1 **Still Water Fisheries**

(i) View of Licensee

In 79 cases (99%) involving still waters, the licensee considered that the use of a variety of non-lethal scaring measures was at least partly effective in helping to deter birds from feeding within the fishery and therefore reducing damage levels. In 1 Cormorant case (1%), the licensee was of the opinion that scaring was totally ineffective due to the presence of a large roost on site.

On this basis, it is considered likely that fishery managers will continue to employ such measures whilst seeking ways to improve the overall effect of the action which is taken.

(ii) View of RDS Wildlife Adviser

In relation to still water fisheries, the Adviser agreed with the opinion of the licensee that in 99% of cases, non-lethal anti-predation measures were partly responsible for reducing the impact of piscivorous birds.

3.4.2 **River Fisheries**

(i) View of Licensee

In 30 cases (97%) involving river fisheries, the licensee considered that the use of a variety of non-lethal anti-predation measures was at least partly effective in helping to deter birds from feeding within the fishery and therefore reducing damage levels. In only 1 Cormorant case did the licensee consider scaring to be ineffective.

(ii) View of RDS Wildlife Adviser

In 30 cases (97%), the Adviser was of the opinion that non-lethal anti-predation measures were partly responsible for reducing the impact of piscivorous birds on river fisheries. Although the Adviser agreed with the licensee in 1 Cormorant case that scaring had been ineffective, the view taken was that the licensee had not implemented the method (human presence) appropriately.

3.4.3 Adverse Public Reaction to Non-Lethal Scaring Measures

Although concerns are sometimes expressed that the use of scaring measures, particularly noise generation, will meet with opposition in urban environments or cause disturbance on sites where other birds are present (such as nature reserves), only 2 cases were reported where this proved to be a problem. Fortunately, the sensitivity of fishery managers to these concerns is a factor in preventing problems of this type arising often. In one case, the local Parish Council advised the licensee to desist from using a gas gun (under noise & pollution regulations), due to complaints received from neighbours. The licensee complied with this request. In the other case, the use of bird scaring rockets resulted in a member of the public reporting the licensee to the Police for illegally shooting birds. No further action was taken once the facts were established.

4.0 RESULTS AND DISCUSSION - STOMACH CONTENTS ANALYSIS

4.1 Details of birds submitted for analysis

4.1.1 Carcasses of shot birds were retrieved by the licensee and retained for collection by RDS. These were then forwarded to CEFAS for examination. In addition to analysing the stomach contents, the detailed examination involved recording basic information on each carcass (e.g. sex and weight) along with any other information provided by RDS on the activities and behaviour of the bird at the time it was shot. It should be noted that the manner in which the sample of carcasses was obtained was not designed to be part of an R&D programme.

4.1.2 In total, 229 bird carcasses were forwarded to Lowestoft for examination during the 2001/2 'season', comprising 201 cormorants, 27 herons and 1 goosander. Full details of the shooting particulars and the stomach analysis results are provided in the attached tables (*see Appendices L - V*). However, two of the cormorants, which were shot at a coarse fish farm, were too badly decomposed to permit stomach analysis and hence details for these birds are included in the shooting summary only.

- In 2001/02, the majority of the cormorants (78%) were shot at stillwater fisheries; the remainder were shot either on rivers (13%) or at fish farms (9%). Most of the herons were shot at fish farms (85%); the remainder were shot on rivers (15%). The goosander was shot at a stillwater coarse fishery.
- Just over half of the cormorants shot at stillwater sites in 2001/2 were shot at trout fisheries (57%); the others were shot at coarse fisheries. This is broadly similar to the relative proportions observed in 2000/01. It should

be noted that most trout fisheries also support stocks of coarse fish. In some cases the presence of such fish supports an active coarse fishery, while in other waters this is not the case. For presentation purposes, therefore, the stomach analysis results for stillwater fisheries have tended to be split into three categories comprising: trout only fisheries, coarse only fisheries, and mixed trout and coarse fisheries. These categories are inevitably somewhat arbitrary, since the relative importance of trout and coarse fish varies from site to site.

- In addition, it should be noted that at a number of sites at which cormorants have been shot, RDS Consultants have previously advised that birds had access to alternative fisheries in the vicinity of the fishery where they were shot. Diet data cannot therefore be guaranteed to be representative of a particular fishery. However, despite these caveats, such biases are not thought to be substantial and the above categorisation of the results is felt to provide a useful basis for comparing the diet at these broadly different fishery 'types'.

4.1.3 As in previous years, a reasonably large proportion of the cormorants examined (42% of those from riverine sites, 33% from stillwater fisheries, and 17% from fish farms) had totally empty stomachs. This is thought to be a consequence of the fact that many of the birds were shot in the morning prior to the onset of feeding. At first light, cormorants regurgitate the indigestible remains of previous meals, as pellets, prior to starting feeding. However, it is known that birds may also regurgitate food at the time of shooting. Efforts are made to assess if the latter may have occurred during post-mortem examination of the birds, by checking for fish scales or other remains in the oesophagus, and by looking for evidence of distended but empty stomachs. In some cases, birds have been observed regurgitating prey items at the time of shooting and these regurgitated fish have been recovered by the licensees and have been forwarded for examination with the bird.

4.1.4 On average, cormorants shot in 2001/2 ranged in size from 2,413g at fish farms and 2,436g at riverine sites to 2,664g at stillwaters. Examination of the external characteristics of each cormorant (in particular the shape of the coloured area of skin adjacent to the rear of the beak – 'the gular angle') can be used to distinguish sub-species. On this basis, the native sub-species (*Phalacrocorax carbo carbo*) were estimated to comprise 57% of the birds examined, while birds of the 'continental' sub-species *P.c. sinensis* comprised 23% of the total. A further 16% of the birds were of uncertain identity (intermediate characteristics) and 4% were too damaged for accurate identification. These proportions are very similar to those recorded in 2000/01. It is not clear whether the intermediate birds represent extremes of the two sub-species or some level of hybridisation. It is planned to investigate this further and tissue samples have been taken from birds shot over the past two years to enable genetic analysis; this will be conducted by the Centre for Ecology and Hydrology. As in previous years, more male cormorants (61.3%) were shot in 2001/02 than female cormorants (38.2%) with one bird unsexed

due to damage (0.5%). The reasons for this are not entirely clear, but may represent different patterns of winter migration between the two sexes. Also in common with previous years, immature birds comprised a higher proportion of the birds shot in 2001/02 (72.4%) than adult birds (27.1%), with one bird unassigned.

4.2 Summary of Detailed Results

- 4.2.1 Details of the stomach contents of all the birds examined are included in the attached tables (*see Appendices L to S*). These are based on macroscopic analysis of intact and semi-intact remains only, with fish being identified to species or family level wherever possible. More detailed analysis of stomach samples (using bones, otoliths, etc.) will also be carried out on all unidentifiable remains recovered from the stomachs of the birds. However, it is not possible to complete these investigations in time to include the results in the annual monitoring report.
- 4.2.2 Based on the macroscopic examinations, the composition of the diet of cormorants shot at inland fisheries in 2001/2 appears to largely reflect the range of prey species available at the sites at which the birds were shot. However, there were a few instances where birds shot at stillwater fisheries contained species more normally associated with running waters (e.g. gudgeon) and coastal waters (e.g. sprat). This suggests these birds may have been feeding recently at locations other than where they were shot. Nonetheless, the broad pattern of prey consumption is consistent with previous years and with the fact that cormorants are regarded as adaptable opportunist feeders, which consume locally abundant species.
- 4.2.3 For cormorants shot at stillwater coarse fisheries in 2001/2, all but 2 of the 40 birds containing identifiable remains had consumed only coarse fish, with 1 bird containing salmonids and another marine fish species. At stillwater trout fisheries, cormorants were observed to contain salmonids (trout), with 12% of the birds from 'mixed coarse and trout' fisheries and 16% from 'trout only' fisheries containing only salmonid (trout) remains. However, even at these fishery 'types' more birds were found to have consumed coarse fish species than salmonids. For the 'trout only' fisheries 31% of birds were found to contain coarse fish only, compared with 49% of birds at the 'mixed coarse and trout' fisheries. This is broadly consistent with the expected prey availability, but indicates that the presence of coarse fish can 'buffer' the impact of cormorants on trout in many stillwater put-and-take fisheries. It should be noted, however, that where coarse fish are a target species for anglers, the loss of coarse fish in a stillwater fishery can be of equal concern to a fishery manager as the losses of trout.
- 4.2.4 All but 1 of the 26 cormorants shot on rivers were shot on 'chalkstream' sites in Southern England; these are primarily game (salmonid) fisheries, but also contain substantial populations of coarse fish. Of these birds, 11 were empty

(44%), 7 contained salmonids only (28%), 4 coarse fish only (16%) and 3 unidentifiable remains. The salmonid species (based on macroscopic examination) recorded in the stomach samples from these sites were brown trout, rainbow trout and grayling.

- 4.2.5 For cormorants shot at fish farm sites, 17% were empty, 61% contained only coarse fish remains, 5% contained salmonid remains only and a further 17% of the birds contained unidentifiable remains (based on macroscopic examination).
- 4.2.6 The identifiable prey items recorded in cormorant stomach samples in 2001/2 comprised entirely freshwater fish species (with the exception of 3 sprats found in one bird). There is thus little evidence to suggest that birds had recently fed on estuaries or coasts prior to being shot at inland sites.
- 4.2.7 None of the cormorants examined contained both coarse fish and salmonids (based on macroscopic examination), even in locations where both 'types' of fish were present. Similar results have been noted in previous years. This suggests that, having identified a certain feeding area or aggregation of fish, birds tend to continue to feed in the same manner/location, at least during that particular feeding bout.
- 4.2.8 The average weight of the prey items for different prey 'categories' (e.g. coarse only, salmonid only) in the stomachs of shot birds are included in the appended tables. It should be noted, however, that these data do not take any account of the level of digestion that has occurred, or the fullness of the stomach, and should not be regarded as being indicative of daily food consumption.
- 4.2.9 On average, cormorants, which had been feeding on coarse fish, had consumed a number of smaller fish; by contrast, birds that had been feeding on trout tended to contain a single larger fish. As in past years, the range of prey sizes consumed by cormorants varied from small fry weighing less than 1g to large fish of well over 500g. Based on the provisional macroscopic analysis, the largest coarse fish recorded in the stomach samples in 2001/2 was a roach of 702.5g, and the largest salmonid a rainbow trout of 794.2g.
- 4.2.10 As in previous years, some of the cormorants sent for examination were found to be carrying leg rings; 5 of the 201 birds (2.5%) received in 2001/2 carried one or more rings. This is a similar proportion to 2000/01 but a smaller proportion than that recorded in preceding years. These rings were removed from the birds and returned to the British Trust for Ornithology (BTO), together with details of the date and place (county/river catchment) of shooting.
- 4.2.11 Of the 32 herons shot under licence, 13 birds (48%) were found to be empty, 3 birds (11%) contained the remains of small mammals, 1 contained salmonid remains, 1 coarse fish remains, and 1 contained both coarse fish

and mammal remains. The remaining 8 birds (29%) contained only small amounts of unidentifiable remains (based on macroscopic examination). Details of the mean weight of food in the stomach of the herons are also included in the appended tables, although as for the cormorants (see 15 above) these data do not provide any indication of daily food intake.

4.2.12 The one goosander shot under licence contained unidentified fish remains only (based on macroscopic examination). Further details will be available once the detailed bone analysis has been completed.

5.0 RESULTS AND DISCUSSION – SHOOTING DETAILS

5.1 Cormorants (see appendix T)

5.1.1 Date shot

Most (95%) of the cormorants sent for examination in 2001/2 were shot between October 2001 and March 2002. The monthly totals over this period ranged from 14 to 46. The remaining birds were shot during August and September 2000 (n=4), or in April 2002 (n=3); for a small number of birds the shooting date was unspecified (n=3). The largest numbers of birds shot each month were recorded in the period December 2001 to February 2002 (58% overall).

5.1.2 Time Shot

Birds were predominantly shot in the morning (62%), with a smaller proportion (19%) during the afternoon. No information on the time of shooting was available for 38 of the birds (19%).

5.1.3 Activity of Birds

At the time of shooting, 56% of the cormorants were reported to be feeding or on the water, 29% were described as flying into the fishery or leaving the surface of the water and 6% were reported to be roosting or loafing. The activity at the time of shooting was not specified for 18 of the birds received (9%). Full details of the date and time of shooting, and of the birds activity at the time of shooting, are given in the appended tables.

5.2 **Hérons** (See Appendix U)

5.2.1 **Date Shot**

The 27 herons were shot between October 2001 and February 2002.

5.2.2 **Time Shot**

Only 22% of the birds were shot in the morning, with the remaining 78% being shot in the afternoon.

5.2.3 **Activity of birds**

The majority (74%) of the shot birds were reported to be shot in flight in the vicinity of the fish farm/fishery at the time of shooting, and the remaining 7 (26%) were reported to be feeding.

5.3 **Discussion**

5.3.1 **Date Shot**

Most of the birds were shot during the months of October - March. This appears to coincide with the times when it is reported that fisheries are under the greatest threat from piscivorous birds. Also, non-lethal scaring or deterrent measures are introduced when the birds begin to visit and predate on fisheries and these approaches require reinforcement with lethal shooting as the birds become more persistent and less responsive to other methods. This means that a period of time elapses before such action is taken and this has the effect of concentrating licensed shooting during the vulnerable part of the season.

5.3.2 **Time Shot**

The concentration of shooting during the morning coincides with the time when birds tend to visit fisheries to feed. This places pressure on the fishery management to ensure that the necessary human disturbance and co-ordination of scaring efforts can be targeted at these times when, if bird predation was not a problem, it would be unlikely that the same level of staffing would be required.

5.3.3 **Shooting Strategy**

It is stressed to licensees that the emphasis with licensed shooting is to maximise the scaring effect on the bird population which is frequenting the fishery. Therefore, birds are being shot when flocks or groups of birds are flying within the boundaries of the fishery site, when it proves necessary to disperse roosts within the fishery or when birds are caught in the act of

feeding and are despatched on, or close to, the surface of the water. The shooting of what were perceived to be persistent, individual birds that were considered to be acting as decoys to others, was viewed as an important factor in several cases.

- 5.3.4 In addition, primary considerations include only shooting birds when they are within effective killing range and making the necessary arrangements for carcasses to be retrieved for analysis.
- 5.3.5 Licensees are instructed to shoot birds only to reinforce the fishery protection regime; they should not seek to reach the permitted limit as soon as possible or even, to shoot the maximum number of birds during the licence period unless this proves to be necessary. Flexibility and a variable response to the changing conditions within the fishery also impose practical difficulties with regard to the attendance by Wildlife Advisers during licensed shooting.
- 5.3.6 Licensees are positively discouraged from seeking to shoot birds only when they are observed to have fed so maximising the weight of fish taken and found on analysis. This would serve only to interfere with the effectiveness of the protection strategy and provide distorted information which would represent the effect of predation without any effort being taken by the fishery management to scare or deter the birds. This would not be typical of the situations encountered or the normal action taken in response to such problems.

6.0 SUMMARY

- 6.1 In 22 river and 55 still water situations (69% of all licences) where birds were shot, the combined use of licensed shooting and non-lethal measures provided a positive contribution to resolving the problems of piscivorous bird predation in individual fisheries. This suggests that in those cases where non-lethal measures alone have not been sufficient and where a licence has been issued, such a regime of protection or management strategies will remain the best approach to such problems for the foreseeable future.
- 6.2 Changes to fishery management such as, habitat modifications and alternative stocking regimes, reflect the possible options available to reduce the attraction to, and impact of, piscivorous birds. At present, success has been restricted to relatively small still water fisheries. On rivers and in most coarse fisheries, particularly those on extensive water bodies such as reservoirs, there appears to be little or no prospect of being able to manipulate or modify fishery management to reduce predation.
- 6.3 The main conclusions from the monitoring of cases where licences were issued are that:

- the combination of licensed shooting and the use of non-lethal anti-predation measures has proved to be the most successful approach to date in protecting fisheries from predation by piscivorous birds;
- of the limited options available, human disturbance combined with non-lethal shooting has provided the most effective non-lethal scaring regime;
- licensed shooting was concentrated during the period October through to March;
- shooting was usually undertaken in the morning when birds first visit the fisheries; and
- in most situations, licensees consider that it is not practicable to resolve bird predation problems by changing the management of the fishery.

RDS
July 2002

APPENDIX A

LICENCES ISSUED IN 2001-2002 TO PERMIT THE SHOOTING OF LIMITED NUMBERS OF PISCIVOROUS BIRDS AS AN AID TO PROTECTING INLAND FISHERIES.

Bird Species	No. of Licences Issued	Fishery Type	
		Still Water	River
Cormorant <i>Phalacrocorax carbo</i>	94	70	24
Grey Heron <i>Ardea cinerea</i>	16	9	7
Goosander <i>Mergus merganser</i>	1	1	-

APPENDIX B

INFORMATION ON (i) NUMBERS OF PISCIVOROUS BIRDS LICENSED TO BE SHOT, (ii) ACTUAL NUMBERS OF BIRDS SHOT AND (iii) NUMBERS OF BIRDS RETRIEVED AND FORWARDED TO CEFAS FOR ANALYSIS IN 2001-2002.

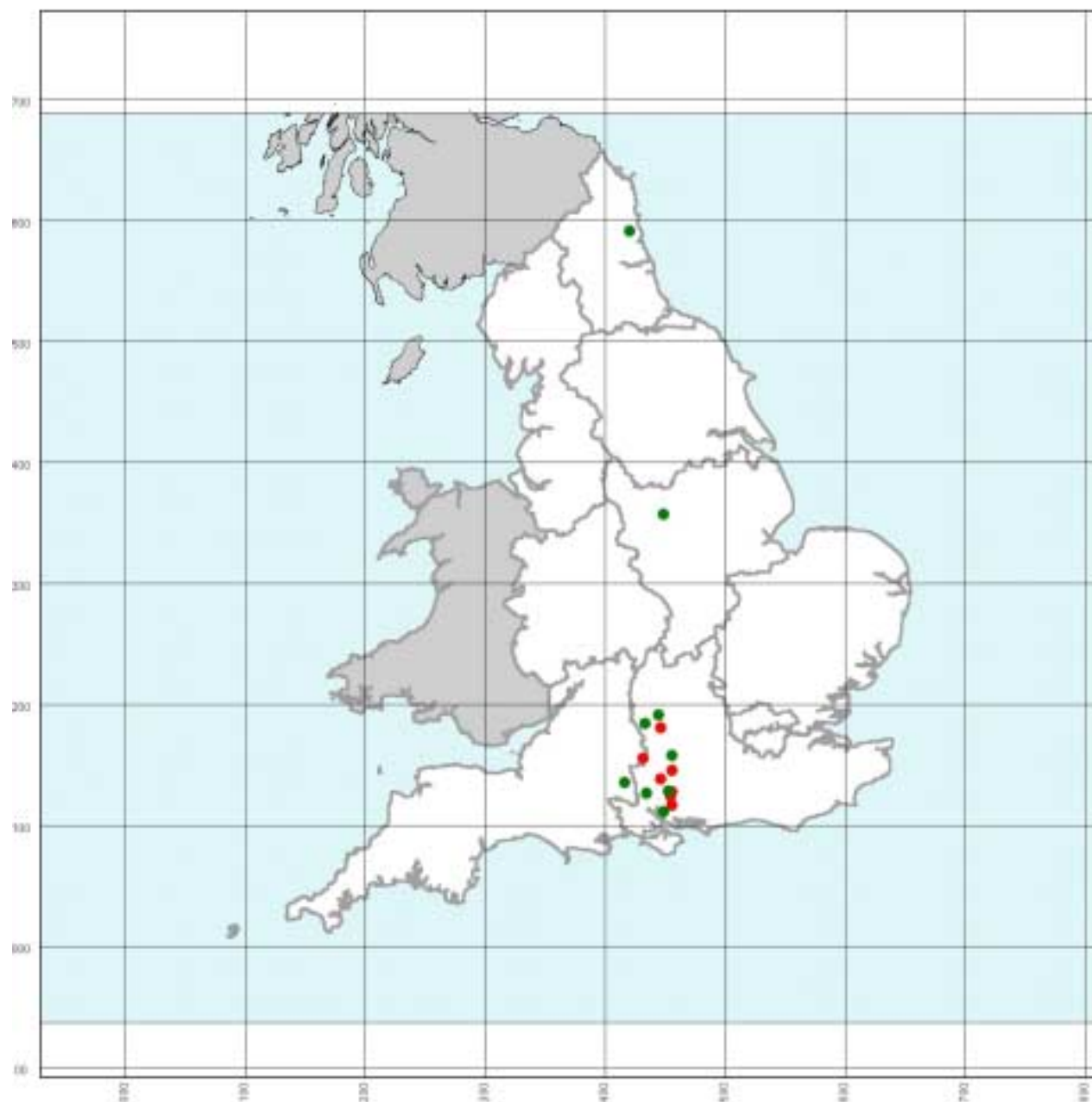
Bird Species	No. Licensed to be Shot	Actual No. Shot	No. Retrieved & Sent for Analysis
Cormorant <i>Phalacrocorax carbo</i>	545	225	201
Grey Heron <i>Ardea cinerea</i>	68	28	27
Goosander <i>Mergus merganser</i>	5	1	1



Appendix D:

Licences issued throughout England in 2001-2002, to permit the shooting of Grey Herons at still water & river fisheries.

- Still Water Fisheries
- River Fisheries
- Government Offices



Scale 1:4 820 000

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Map Produced on 25 May 2002 from NRI's NRI/NERC/NERC/NERC System

APPENDIX F

Evaluation of the efficacy of licensed shooting in 2001-2002, to deter piscivorous birds from feeding at inland fisheries. Values represent number of licences.

Bird Species	Assessor	Partly Effective		Ineffective		Unable to Assess		Not Utilised	
		Still Water	River	Still Water	River	Still Water	River	Still Water	River
Cormorant	<i>Licensee</i>	48	18	1	0	21	6	21	6
	<i>Adviser</i>	49	18	0	0	21	6		
Grey Heron	<i>Licensee</i>	4	4	1	0	4	3	4	3
	<i>Adviser</i>	5	4	0	0	4	3		
Goosander	<i>Licensee</i>	1	-	0	-	0	-	0	-
	<i>Adviser</i>	1	-	0	-	0	-		

APPENDIX G

Scaring measures implemented in 2001-2002, to deter Cormorants, Grey Herons & Goosanders from feeding at inland fisheries. Values represent number of licences.

Fishery Type	Human Presence	Shooting to Scare	Pyro-technics	Rockets	Sirens/Horns	Gas guns/Crow Bangers	Flags/Plastic Bags	Human Mimics i.e. Scarecrows	Predator Mimics	Kites/Rotating Scarers	Others
Still Water	80 (100%)	75 (94%)	12 (15%)	23 (29%)	5 (6%)	17 (21%)	7 (9%)	14 (18%)	0 -	6 (8%)	12 (15%)
River	31 (100%)	30 (97%)	0 -	1 (3%)	0 -	2 (6%)	2 (6%)	10 (32%)	2 (6%)	2 (6%)	3 (10%)
All Sites	111 (100%)	105 (95%)	12 (11%)	24 (22%)	5 (5%)	19 (17%)	8 (8%)	24 (22%)	2 (2%)	8 (7%)	15 (14%)

APPENDIX H

Proofing & exclusion measures established in 2001-2002, to deter Cormorants, Grey Herons & Goosanders from feeding at inland fisheries. Values represent number of licences.

Fishery Type	Netting	Fencing Water's Edge	Erection of Wire/Tape
Still Water	11 (14%)	3 (4%)	6 (8%)
River	0 -	0 -	2 (6%)
All Sites	11 (10%)	3 (3%)	8 (7%)

APPENDIX I

Habitat modifications undertaken in 2001-2002, to deter Cormorants, Grey Herons & Goosanders from feeding at inland fisheries. Values represent nos. of licences.

Fishery Type	Fish Refuges	Weed Mgmt	Bank Vegetation Mgmt	Roost Removal
Still Water	12 (16%)	3 (4%)	11 (14%)	3 (4%)
River	0 -	10 (32%)	10 (32%)	1 (3%)
All Sites	12 (11%)	13 (12%)	21 (19%)	4 (4%)

APPENDIX J

Modifications in stocking regimes undertaken in 2001-2002, to try to reduce the level of Cormorant, Grey Heron & Goosander damage to fish stocks at inland fisheries. Values represent number of licences.

Fishery Type	Timing of Stocking	Size of Fish Stocked	Alternative Prey Stocked
Still Water	21 (26%)	24 (30%)	0 -
River	2 (6%)	0 -	0 -
All Sites	23 (21%)	24 (22%)	0 -

APPENDIX K

Evaluation of the efficacy of non-lethal anti-predation measures implemented in 2001-2002, to deter Cormorants, Grey Herons & Goosanders from feeding at inland fisheries. Values represent number of licences.

Fishery Type	Assessor	Partly Effective	Ineffective
Still Water	<i>Licensee</i>	79 (99%)	1 (1%)
	<i>Adviser</i>	79 (99%)	1 (1%)
River	<i>Licensee</i>	30 (97%)	1 (3%)
	<i>Adviser</i>	30 (97%)	1 (3%)
All Sites	<i>Licensee</i>	109 (98%)	2 (2%)
	<i>Adviser</i>	109 (98%)	2 (2%)

Stomach analysis of Cormorants shot under WCA licences during 2001/2

APPENDIX L

Fishery type	Fish species present	Number of birds examined	Mean weight of birds (g)	When shot	NUMBERS (AND %) OF BIRDS CONTAINING:				
					Empty stomachs	Unidentified remains only	Salmonids only (trout, salmon & grayling)	Coarse fish (Including: eel, flounder & lamprey)	Marine species only
Fish Farm	Trout only	2	2301.9	Jan - Feb '02	1 50%	1 50%	0 -	0 -	0 -
	Trout & coarse	6	2441.4	Nov - Dec '01	1 17%	1 17%	1 17%	3 50%	0 -
	Coarse only	10	2418.8	Oct '01 - Feb '02	1 10%	1 10%	0 -	8 80%	0 -
Fish Farm	Sub-total	18	2413.3	Oct '01 - Feb '02	3 16.7%	3 16.7%	1 5.6%	11 61.1%	0 -
River	Mainly Game (Chalkstreams)	25	2437.3	Oct '01 - Mar '02	11 44%	3 12%	7 28%	4 16%	0 -
	Coarse only	1	2399.3	Nov '01	0 -	0 -	0 -	1 100%	0 -
River	Sub-total	26	2435.8	Oct '01 - Mar '02	11 42.3%	3 11.5%	7 26.9%	5 19.2%	0 -
Stillwater	Trout only	55	2737.7	Sep '01 - Mar '02	23 41.8%	6 10.9%	9 16.4%	17 30.9%	0 -
Stillwater	Coarse & Trout	33	2872.7	Nov '01 - Apr '02	10 30.3%	3 9.1%	4 12.1%	16 48.5%	0 -
Stillwater	Coarse only	67	2500.1	Aug '01 - Apr '02	18 26.9%	9 13.4%	1 1.5%	38 56.7%	1 1.5%
Stillwater	Sub-total	155	2663.7	Aug '01 - Apr '02	51 32.9%	18 11.6%	14 9.0%	71 45.8%	1 0.6%
Total (all sites)		199	2611.3	Aug '01 - Apr '02	65 32.7%	24 12.1%	22 11.1%	87 43.7%	1 0.5%

Note: date shot does not include birds where date shot is unspecified

APPENDIX M

Stomach analysis of Cormorants shot under WCA licences during 2001/2 - fish farms

Farm Type (species present)	Number of birds examined	Mean weight of birds (g)	When shot	Mean weight and weight range of stomach contents (excluding empty birds)				Fish species (& Nos.) consumed (in descending order of occurrence)
				Coarse fish only	Salmonids only	Unidentified species	All fish	
Trout only	2	2301.9	Jan - Feb '02	-	-	35.5g 1 bird	35.5g 1 bird	Unidentified remains (1)
Trout & coarse	6	2441.4	Nov - Dec '01	119.6g Range: 4.2g - 217.1g 3 birds	220.8g 1 bird	3g 1 bird	116.5g Range: 3g - 220.8g 5 birds	Unidentified remains (4) Goldfish (3) Chub (1) Grayling (1) Unidentified cyprinid (1)
Coarse only	10	2418.8	Oct '01 - Feb '02	155.1g Range: 68g - 299g 8 birds	-	5.4g 1 bird	138.5g Range: 5.4g - 299g 7 birds	Unidentified remains (7) Common Carp (6) Roach (5) Gudgeon (4) Unidentified cyprinid (1)

- Notes:
- For these summary tables, salmonids include: salmon, trout and grayling, and coarse fish are loosely defined to incorporate all other 'freshwater' species including, for example: eels, lampreys and flounder.
 - Where possible, prey remains were identified to species. Failing this, prey were identified as either salmonid or coarse remains. In some cases identification was not possible on a macroscopic scale.

APPENDIX N

Stomach analysis of Cormorants shot under WCA licences during 2001/02 – rivers

River fishery type (species present)	Number of birds examined	Mean weight of birds (g)	When shot	Mean weight and weight range of stomach contents (excluding empty birds)				Fish species (& Nos.) consumed (in descending order of occurrence)
				Coarse fish only	Salmonids only	Unidentified species	All fish	
Mainly Game (Chalkstreams)	25	2437.3	Oct '01 - Mar '02	115.9g Range: 46.1g - 187.4g 4 birds	309.8g Range: 18.1g - 736.6g 7 birds	45.2g Range: 19g - 84.1g 3 birds	192.3g Range: 18.1g - 736.6g 14 birds	Unidentified remains (12) Unidentified cyprinid (9) Brown Trout (3) Minnow (2) Unidentified Salmonid (2) Pike (1) Rainbow Trout (1) Grayling (1) Eel (1)
Coarse Only	1	2399.3	Nov '01	227.4g 1 bird	-	-	227.4g 1 bird	Unidentified cyprinid (2) Perch (1) Unidentified remains (1)

- Notes:
- a) For these summary tables, salmonids include: salmon, trout and grayling, and coarse fish are loosely defined to incorporate all other 'freshwater' species including, for example: eels, lampreys and flounder.
 - b) Where possible, prey remains were identified to species. Failing this, prey were identified as either salmonid or coarse remains. In some cases identification was not possible on a macroscopic scale.

Stomach analysis of Cormorants shot under WCA licences during 2001/2 – stillwaters

APPENDIX O

Stillwater fishery Type (species present)	Number of birds examined	Mean weight of birds (g)	When shot	Mean weight and weight range of stomach contents (excluding empty birds)					Fish species (& Nos.) consumed (in descending order of occurrence)
				Coarse fish only	Salmonids only	Unidentified species only	Marine species only	All fish	
Trout only	55	2737.7	Sep '01 - Mar '02	122.7g Range: 13g - 490.6g 17 birds	458.6g Range: 25g - 794.2g 9 birds	101.3g Range: 5.5g - 266.4g 6 birds	-	213.2g Range: 5.5g - 794.2g 32 birds	Perch (37) Unidentified remains (18) Rainbow Trout (4) Trout (species uncertain) (4) Unidentified cyprinid (3) Roach (2) Brown Trout (1) Chub (1)
Coarse & Trout	33	2872.7	Nov '01 - Apr '02	246.6g Range: 29.5g - 702.5g 16 birds	448.0g Range: 68.7g - 619.8g 4 birds	36.6g Range: 5.5g - 56.2g 3 birds	-	254.2g Range: 5.5g - 702.5g 23 birds	Roach (41) Unidentified remains (14) Unidentified cyprinid (13) Perch (7) Pike (4) Rainbow Trout (3) Eel (2) Gudgeon (2) Common Bream (1) Trout (species uncertain) (1)
Coarse only	67	2500.1	Aug '01 - Apr '02	112.6g Range: 3.8g - 275.4g 38 birds	558.9g 1 bird	33.1g Range: 6.5g - 91g 9 birds	13.7g 1 bird	105.1g Range: 3.8g - 558.9g 49 birds	Roach (68) Unidentified remains (41) Unidentified cyprinid (40) Gudgeon (22) Common Bream (15) Perch (11) Common Carp (4) Rudd (3) Sprat (3) Tench (2) Pike (2) Rainbow Trout (1)

- Notes: a) For these summary tables, salmonids include: salmon, trout and grayling, and coarse fish are loosely defined to incorporate all other 'freshwater' species including, for example: eels, lampreys and flounder.
 b) Where possible, prey remains were identified to species. Failing this, prey were identified as either salmonid or coarse remains.

APPENDIX P

Stomach analysis of Grey Herons shot under WCA licences during 2001/2

Fishery type	Fish species present	Number of birds examined	Mean weight of birds (g)	When shot	NUMBERS (AND %) OF BIRDS CONTAINING:					
					Empty stomachs	Unidentifiable remains only	Salmonids only (trout, salmon & grayling)	Coarse fish (Including: eel, flounder & lamprey)	Coarse fish & Mammal remains	Mammal remains only
Fish Farm	Trout	17	1668.7	Oct '01 - Feb '02	10 58.8%	3 17.6%	0 -	0 -	1 5.9%	3 17.6%
Fish Farm	Coarse	1	1829.9	Oct '01	0 -	0 -	0 -	1 100.0%	0 -	0 -
Fish Farm	Coarse & Trout	5	1723.2	Nov '01	0 -	4 80.0%	1 20.0%	0 -	0 -	0 -
Fish Farm	Subtotal	23	1687.6	Oct '01 - Feb '02	10 43.5%	7 30.4%	1 4.3%	1 4.3%	1 4.3%	3 13.0%
River	Mainly Game (Chalkstream)	4	1757.3	Dec '01 - Feb '02	3 75.0%	1 25.0%	0 -	0 -	0 -	0 -
Total (all sites)		27	1727.1	Oct '01 - Feb '02	13 48.1%	8 29.6%	1 3.7%	1 3.7%	1 3.7%	3 11.1%

APPENDIX Q

Stomach analysis of Grey Herons shot under WCA licences during 2001/2:- All Waters

Fishery type	Number of birds examined	Mean weight of birds (g)	When shot	Mean weight and weight range of stomach contents (excluding empty birds)						Fish species (& Nos.) consumed (in descending order of occurrence)
				Coarse fish only	Salmonids only	Unidentified species	Coarse fish & Mammal	Mammal only	All prey	
Fish Farm (Trout only)	17	1668.7	Oct '01 - Feb '02	-	-	9.1g Range: 0.9g - 24.9g 3 birds	36.2g 1 bird	17.8g Range: 2.6g - 45.4g 3 birds	16.7g Range: 0.9g - 45.4g 7 birds	Small mammal (6) Unidentified remains (3) Minnow (1)
Fish Farm (Coarse only)	1	1829.9	Oct '01	77.4g 1 bird	-	-	-	-	77.4g 1 bird	Common Carp (4) Unidentified remains (1)
Fish Farm (Coarse & Trout)	5	1723.2	Nov '01	-	94.6g 1 bird	16.4g Range: 2.5g - 37.7g 4 birds	-	-	32g Range: 2.5g - 94.6g 5 birds	Unidentified remains (4) Rainbow Trout (1)
River (Mainly Game) (Chalkstream)	4	1757.3	Dec '01 - Feb '02	-	-	6.5g 1 bird	-	-	6.5g 1 bird	Unidentified remains (1)

Notes:

- a) For these summary tables, salmonids include: salmon, trout and grayling, and coarse fish are loosely defined to incorporate all other 'freshwater' species, including, for example: eels, lampreys and flounder.
- b) Where possible, prey remains were identified to species. Failing this, prey were identified as either salmonid or coarse remains. In some cases identification was not possible on a macroscopic scale.

APPENDIX R

Stomach analysis of Goosanders shot under WCA licences during 2001/2

Fishery type	Fish species present	Number of birds examined	Mean weight of birds (g)	When shot	Unidentifiable remains only	Salmonids only (trout, salmon & grayling)	Coarse fish and Salmonids
Stillwater	Coarse	1	1756.3	Nov '01	1	0	0

APPENDIX S

Stomach analysis of Goosanders shot under WCA licences during 2001/2:- All Waters

Fishery type	Number of birds examined	Mean weight of birds (g)	When shot					Fish species (& Nos.) consumed (in descending order of occurrence)
				Unidentified species	Salmonids only	Coarse fish & salmonids	All prey	
Stillwater (Coarse only)	1	1756.3	Nov '01*	13g 1 bird	-	-	13g 1 bird	Unidentified remains (1)

Notes: a) For these summary tables, salmonids include: salmon, trout and grayling, and coarse fish are loosely defined to incorporate all other 'freshwater' species, including, for example: eels, lampreys and flounder.

b) Where possible, prey remains were identified to species. Failing this, prey were identified as either salmonid or coarse remains. In some cases identification was not possible on a macroscopic scale.

* Exact dates unspecified but fell within this period

APPENDIX T

Shooting details for 2001/2 - Cormorants

Month	Fishery type								Total	%
	Fish Farm Trout only	Fish Farm Coarse only	Fish Farm Coarse & Trout	Chalkstream Mainly Game	River Coarse only	Stillwater Trout only	Stillwater Coarse & Trout	Stillwater Coarse only		
Aug	0	0	0	0	0	0	0	1	1	0.5%
Sep	0	0	0	0	0	3	0	0	3	1.5%
Oct	0	4	0	3	0	5	0	2	14	7.0%
Nov	0	3	3	3	1	9	7	5	31	15.4%
Dec	0	3	1	5	0	8	4	18	39	19.4%
Jan	1	1	0	4	0	5	6	16	33	16.4%
Feb	1	1	0	9	0	12	9	14	46	22.9%
Mar	0	0	0	1	0	12	5	10	28	13.9%
Apr	0	0	0	0	0	0	2	1	3	1.5%
Unspecified	0	0	2	0	0	1	0	0	3	1.5%
Total	2	12	6	25	1	55	33	67	201	100.0%

Time	Fishery type								Total	%
	Fish Farm Trout only	Fish Farm Coarse only	Fish Farm Coarse & Trout	Chalkstream Mainly Game	River Coarse only	Stillwater Trout only	Stillwater Coarse & Trout	Stillwater Coarse only		
<0700	0	0	0	0	0	5	0	0	5	2.5%
0700-0900	2	1	0	9	0	24	8	31	75	37.3%
0900-1200	0	4	1	4	0	14	7	14	44	21.9%
P.M.	0	3	3	10	1	6	2	14	39	19.4%
unspecified	0	4	2	2	0	6	16	8	38	18.9%
total	2	12	6	25	1	55	33	67	201	100.0%

Activity	Fishery type								Total	%
	Fish Farm Trout only	Fish Farm Coarse only	Fish Farm Coarse & Trout	Chalkstream Mainly Game	River Coarse only	Stillwater Trout only	Stillwater Coarse & Trout	Stillwater Coarse only		
Feeding	1	12	0	12	1	34	10	43	113	56.2%
Flying	1	0	0	9	0	17	11	20	58	28.9%
Roosting	0	0	4	4	0	2	0	2	12	6.0%
Unspecified	0	0	2	0	0	2	12	2	18	9.0%
Total	2	12	6	25	1	55	33	67	201	100.0%

Note: shooting details include 2 birds shot at Longhirst Golf Club Fish Farm - these were too badly decomposed for dissection and so have not been included in the diet or morphometrics tables

APPENDIX U

Shooting details for 2001/2 – Grey Herons

Month	Fishery type				Total	%
	Fish Farm Trout only	Fish Farm Coarse only	Fish Farm Coarse & Trout	River Game		
Oct	5	1	0	0	6	22.2%
Nov	2	0	5	0	7	25.9%
Dec	5	0	0	1	6	22.2%
Jan	3	0	0	2	5	18.5%
Feb	2	0	0	1	3	11.1%
Total	17	1	5	4	27	100%

Time	Fishery type				Total	%
	Fish Farm Trout only	Fish Farm Coarse only	Fish Farm Coarse & Trout	River Game		
<0700	1	0	0	0	1	3.7%
0700-0900	2	0	1	2	5	18.5%
0900-1200	0	0	0	0	0	0.0%
P.M.	14	1	4	2	21	77.8%
Total	17	1	5	4	27	100.0%

Activity	Fishery type				Total	%
	Fish Farm Trout only	Fish Farm Coarse only	Fish Farm Coarse & Trout	River Game		
Feeding	3	1	2	1	7	25.9%
Flying	14	0	3	3	20	74.1%
Total	17	1	5	4	27	100.0%

APPENDIX V

Shooting details for 2001/2 - Goosanders

Month	Fishery type
	Stillwater Coarse only
Nov	1
Total	1

Time	Fishery type
	Stillwater Coarse only
11:30	1
Total	1

Activity	Fishery type
	Stillwater Coarse only
Flying	1
Total	1

