1995 Breeding performance of Northern Goshawks in Wales

by Paul Toyne

The results of the 1995 breeding productivity of a population of Northern Goshawks are presented. 50 nests were found. First egg-laying dates ranged from 30 March - 2 May. Modal and average clutch size was 4 and 3.1 respectively (n=30). Brood size for ringing at all nests was 1.86 and for successful nests only, 2.27 (n=41). 18% of all nesting attempts failed and most mortalities occurred during incubation (12%).

In Wales, Northern Goshawks, hereafter referred to as Goshawks, were first recorded breeding in 1969 (Lovegrove *et al.*1994). However, it was not until 1977 that they were first recorded breeding within the confidential study area in Wales (Toyne 1994). Between 1977 and 1989 Goshawks bred in low densities within Forest A. Since 1990 more extensive field surveys have revealed the Goshawk's true status in other forests within the study area and they are now regarded as common breeding residents, occurring at low densities of 1.4 pairs per 10 km^2 (Toyne 1994).

Various aspects of Goshawk ecology studied include nesting habitat requirements, breeding biology, diet and conservation management (Toyne 1994, Toyne and Ostroznik 1995, Toyne this volume, and Toyne unpublished data).

The aim of the 1995 Goshawk survey was to continue monitoring established nesting territories and search the study area for newly occupied nesting territories.

Study area

The study area is 325,000 ha in size (65 x 50 km) of which approximately 50% is forested. Two large forests; Forest A (3463 ha) and Forest B (6104 ha) and smaller surrounding woods were searched each year for nests. Such forests and woods were either Forest Enterprise owned, company owned or private woodlands. The habitat surrounding these forests was mainly improved grassland used for sheep farming with some open grass moorland. Elevation within the area ranged from 80 - 500 m, with nesting territories found up to 400 m.

Methods

From March to June several methods were employed to find nests depending on the time of the year, namely: inspection of previous nesting areas, forest road surveys and foot surveys. Such methods are described elsewhere (Toyne 1994).

When an active nest was found the type of data collected depended on the progress of the nesting attempt, for example clutch size could not be measured if a nest with young was found. In general, the following data were collected: clutch size, brood size at ringing and at fledging. Nestling maximum wing chords (Spencer 1984) were measured as an index of age calculated from growth curves of Swedish Goshawks. (± 3.8 days, Kenward *et al.* 1993). First egg-laying dates were then estimated by back-dating from the oldest nestling (incubation period = 38 days).

Results

Fifty nesting attempts were monitored, two of which occurred outside the study area. Approximate first egg laying dates ranged from 30 March to 2 May and the median first egg-laying date was 10-11 April (n=40). Most pairs started egg-laying in the first or second week of April (Table 1).

Clutch size was measured at 30 nests; modal clutch size was four and the average clutch size was 3.1 (range 1-4, n= 30, S.D. 0.885). 18% (n=9) of all nesting attempts ended in failure. Six failures occurred during incubation, one at hatching and the young at two nests were

Laying Date	%	No.
24-31 March	2.5	1
1-7 April	37.5	15
8-15 April	35.0	14
16-23 April	20.0	8
24-31 April	2.5	1
1-7 May	2.5	1

Table 1. First egg dates in weekly periods
Numbers shown indicate females laying their first egg

stolen. Of the successful nests (i.e. nests with at least one young that fledged) 93 young, 54 males and 39 females, were ringed. Brood size at ringing for successful nests was 2.27 (range 1-4, n=41, S.D. 0.867). Brood size at ringing for all nests: X= 1.86, range 0-4, n= 50, S.D. 1.178). One dead fledged male was found between ringing and dispersal, so brood size at dispersal was 2.24 per nesting territory for successful nests (range 1-4, n=41, S.D. 0.860). The productivity of Goshawks at nest sites where clutch size was measured was investigated (Table 2.). Most mortalities occurred at incubation rather than the young chick stage or after fledgling.

Discussion

First egg-laying date ranges for 1995 were within the ranges of previous years (1991-1993; 23 March - 16 May, n= 63, Toyne 1994). The median first egg-laying date was the same as past years (11 April, n=63, Toyne 1994) suggesting that the Goshawks' 1995 breeding season chronology was similar to previous years. Modal clutch size was also the same as in past years (Toyne 1994).

In terms of Goshawk productivity for this area, 1995 was a good breeding season with more young being produced than in previous breeding seasons (Toyne 1994 and unpublished data). However, brood size at ringing for successful nests was lower than in previous years (1987-1993; X= 2.5, n=85, Toyne 1994). Poor productivity in previous years was probably due to a combination of poor weather and low food supply. This area does not have any artificial prey populations such as grouse, Pheasant or racing pigeons, nor does it support large flocks of pigeons. But 1995 breeding season weather was good compared to other years. Young chick mortality was low in 1995, as in previous years such mortalities

Female Goshawk with young *E.P.Toyne*

Parameter	Total	Mean	S.D. (N=30)	% of maximum productivity
Eggs laid	93	3.1	0.885	100.0
Unhatched eggs	27	0.9	1.029	29.0
Chicks hatching	66	2.2	1.324	71.0
Chicks dying	6	0.2	-	6.5
Chicks fledging	60	2.0	1.259	64.5
Juveniles dying after fledging	0	0.0	-	0
Juveniles leaving nesting area	60	2.0	1.259	64.5

Table 2. Productivity data from 30 Goshawk nests

accounting for 27 % of maximum productivity (Table 2, Toyne 1994). Reasons for this remain unclear, but the good weather probably gave foraging adults excellent conditions in which to hunt and also meant that the young chicks did not need much brooding, giving adults more time to hunt. Goshawk breeding density has reached saturation in most parts of the study area. In continuous forest some Goshawks nested as close as 1 km, but in general nest spacing was 2 km (range 0.9 - 3.65 km, Toyne 1994). So competition for food must be strong and Goshawk productivity was probably regulated by food supply with pairs in food-rich areas rearing more young than pairs in food-poor areas. This association is also found in Sparrowhawks and other birds of prey (Newton 1979, 1986).

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Female Goshawk with young *E.P.Toyne*

Nestlings very close to fledging *E.P.Toyne*