

## Concise summary of obtained population data Northern Wheatears 2007-2009

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In this document we provide a summary of the number, breeding success and survival of Wheatears in the Noordduinen, the dune area between Callantsoog and den Helder (NH), based on research in 2007, 2008 and 2009.

### *Numbers*

	<b>2007</b>	<b>2008</b>	<b>2009</b>
Number of territories	46	58	49
Number of first broods	45	50	40
Number of 2nd or subsequent broods	12	9	4
Number of broods, phase unknown	1	1	4

In 2007, 2008, en 2009 for 1, 8, 9 territory holders, no nest was found. It is unclear whether these birds never laid eggs, or that the nest failed in an early stage, so before it was found. The nests have not led to young which flew out of the nest. In the calculations of breeding success in the next paragraph, it is assumed that those birds did not have a nest. In 2008 the investigations were more intense than in other years (input student), which implies that some territories at the edge of the area may have been noticed which may have been unnoticed in other years. Taken together, the population of Wheatears in the Noordduinen is more or less stable in the research period. The number of second broods is undoubtedly lower than the real number. Second broods are difficult to find, because at that time young from the first broods fly around, accompanied by the male, while the female is sitting on the nest somewhere. The estimate is however that in 2008 there were fewer second broods as opposed to 2007, and in 2009 fewer than in 2008. These second broods hardly deliver any young which actually flew out in the research period.

### *Survival*

	<b>2007 op 2008</b>	<b>2008 op 2009</b>
Adults	55% (38/69)	52% (35/67)
Male	57% (20/35)	41% (11/27)
Female	53% (18/34)	71% (24/34)
Juvenile	19% (23/124)	14% (23/163)
Early Broods	21% (16/78)	18% (19/108)
Late broods	13% (6/46)	7% (4/55)

The values in the table above are relevant to the *apparent* survival.

No attention is paid to birds which are alive, but have not been seen again, or because as a breeding bird they lead withdrawn lives and therefore have a smaller chance to be noticed. These are minimum estimates, which can be improved by using a formal survival analysis (MARK) which leads to a better recapture/recovery probability. In 2009 one bird is seen which was ringed in 2007, but was not seen in 2008. This shows that the yearly recovery probability is high, but is not 100%.

The apparent survival of adult birds of about 50% agrees with literature data. In 2008 the survival of males and females is similar, in 2009 the survival of males is somewhat lower, and for females clearly higher. Possibly, this is partially due to differences in predation risks in the breeding season: females are more sensitive to ground predators (mammals), and males for aerial predators (birds). Annual fluctuations can occur in this. Foxes are no factor of significance in the study area for predation of Wheatears.

The survival of juveniles, less than 20%, is much lower than those of adults and also lower than literature data (36%). Young from late broods (young ringed after June 1st) with 10% seem to have an even lower survival probability as opposed to the young from early broods, of which 20% survives the first year. From food research done by the Stichting Bargerveen in the Noord-Hollands Duinreservaat it appears late young receive fewer macro nutrients as opposed to early young. Therefore, these young have a poor condition when they have to take care of themselves, and possibly a lower survival probability in the first period after leaving the nest.

It is striking that the calculated survival for juveniles after leaving the nest which were seen again in the same breeding season (30% resp. 23% in 2008 and 2009) is higher than the survival of juveniles after leaving the nest which were not seen again in the same breeding season (10% resp. 5% in 2008 and 2009). This may mean that the number of fledged young in the calculation of nest success is overestimated, for example because the last check on the nest (when the young are ringed, mean at approx. 8 days) and the final check (when the young have fledged) young die which are not found in the nest (lying in the back of entrance to the nest, female removes them). The difference is rather large so that an alternative explanation is more appropriate: there is a relatively high mortality of juveniles directly after leaving the nest. The risk of predation is relatively high at the time (young are not adapted to this), while supply and availability of preys items possibly is problematic at the same time that juveniles need to find part of their food.

The dispersal of Wheatears from the Noordduinen to other areas seems limited. A nestling ringed in Botgat in 2007 has bred in 2008 in NHD. In 2009 dispersion has occurred from ringed nestlings in 2008 towards Texel (1) and NHD (2). Also, on Ameland a colour-ringed bird was seen again, but the combination could not be read, therefore it is unsure that this bird originated from the Noordduinen.

### ***Breeding success***

	<b>2007</b>	<b>2008</b>	<b>2009</b>
Number successful total (1 <sup>st</sup> brood)	45 (36)	49 (41)	42 (35)
Number unsuccessful total (1 <sup>st</sup> )	10 (8)	8 (7)	6 (5)
Number success unknown total(1 <sup>st</sup> )	3 (1)	3 (2)	0 (0)
Classical hatching success total (1 <sup>st</sup> )	82% (82%)	86% (85%)	88% (88%)
Mayfield hatching success total (1 <sup>st</sup> )	65% (70%)	75% (76%)	79% (80%)
Fledged young per			
successful pair total (1 <sup>st</sup> )	4.4 (4.4)	4.5 (4.7)	4.6 (4.7)
Fledged young per			
pair total (1 <sup>st</sup> )	2.9 (3.1)	3.4 (3.6)	3.6 (3.8)

The hatching success is high and varies very little between research years.

The overestimation of the classical hatching success (because the probability of finding successful nests is larger than that of non-successful nests. The number of fledged young per pair shows some variation, and appears to have increased somewhat during the research period. However, no correction was made for second and subsequent broods, which occurred to a greater extent in 2007 as opposed to 2008 and especially 2009. This will contribute to a limited extent to the total number of young produced, therefore it can be stated that the breeding success in all years is lower than the 4.5-5.9 fledged young per pair in Southeast England and the 4.9 fledged young per pair in Wales (Glutz von Blotzheim & Bauer 1988).

### ***Population model***

Based on a fundamental population model, in which no consideration is given to emigration or immigration, it can be calculated how many young per breeding pair per year ( $R_{T=1}$ ) must become fledglings for a stable population.

$$R_{T=1} = 2 * (1-S_{ad})/S_{juv}$$

In which  $S_{ad}$  is the adult survival (thus  $1 - S_{ad}$  the annual mortality among adult birds) and the juvenile survival between the time of fledging and the onset of breeding. The factor  $(1 - s_{ad})/s_{juv}$  must be multiplied with two in order to obtain the necessary reproduction per breeding pair (two birds) . Earlier calculations pointed at about 2.8 young per pair, based on the limited amount of data on survival in the literature (50% for adult birds and 36% for juvenile birds, Glutz von Blotzheim & Bauer 1988). Based on the numbers above from the Kop van Noord-Holland (54% for adults and 16% for juveniles) 5.8 young per pair are necessary, which is not accomplished at all. If we consider the probability of survival of juveniles as an underestimate (because we have not corrected for young which we have not seen, but which still are alive, due to the large site fidelity this will not be of any significance to the adults), and if we take the survival of young at 25%, than 3.7 young per pair are necessary, which is (almost) accomplished in the last two years of research. This would also explain the recent minimal trend which is stable.

#### *Preliminary conclusion*

This first analysis of the population dynamical data, shows that relative to populations in other countries, the breeding success and the survival of the young is low in the first period after fledging. The underlying causes are probably related to a lack of large prey items, especially in the period of June/July. Different changes in habitat quality and management can play a role in this (Van Oosten et al. (in preparation.))