

# THE DECLINE IN BREEDING WADER POPULATIONS ON TEALHAM AND TADHAM MOORS ON THE SOMERSET LEVELS, 1984–90

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## SUMMARY

The numbers of the ground-nesting birds, Snipe *Gallinago gallinago* L., Redshank *Tringa totanus* L., Lapwing *Vanellus vanellus* L., Curlew *Numenius arquata* L. and Yellow Wagtail *Motacilla flava* L. ssp. *flavissima* Blyth, were counted over seven breeding seasons, 1984–90, on grazing marsh at Tealham and Tadham Moors on the Somerset Levels.

The counts showed a significant decline both for Snipe and for total wader numbers on land within the Site of Special Scientific Interest (SSSI) not owned by the Somerset Trust for Nature Conservation (STNC).

Numbers of both Snipe and total waders showed no significant change over the period on land owned by the STNC. By 1990, 82% of Snipe were breeding on the 5% of the SSSI owned by the STNC.

Yellow Wagtail, not dependent on wet ground, was more evenly distributed and showed no significant change in numbers.

It is suggested that the wader decline was due to increasingly dry spring ground conditions which either made the ground too hard for the birds to feed, or promoted changes in agricultural practice which directly destroyed nests or reduced nesting cover and thereby increased the risk of predation.

On STNC land attempts have been made to keep fields wet and traditional agricultural practice has been maintained. No predator control has been undertaken. This suggests that increased predation is not a significant factor in breeding wader decline on the Moors, and that to preserve breeding bird interest, the fields must remain saturated until early summer and traditional agricultural practices must be resumed.

## KEYWORDS

Breeding, waders, Snipe, water-levels, predation, Somerset Levels.

## INTRODUCTION

Tealham and Tadham Moors lie on the flood plain of the River Brue, between Wedmore and Westhay, Somerset. They consist of grazing marsh overlying a fen peat which is flooded in winter by water draining from the surrounding limestone hills. In 1985, 859 ha were notified as a Site of Special Scientific Interest (SSSI) by the Nature Conservancy

Council (NCC). This gave the NCC powers to prevent changes in land management which are detrimental to the scientific interest, but only limited powers to reverse damaging activities already taking place. Notification was on the basis of data collected in 1977 indicating a nationally-rare assemblage of large areas of unimproved, species-rich grazing marsh crossed by ditches containing rich communities of rare invertebrates and macrophytes and with significant populations of wintering waterfowl and waders, and breeding waders. The last include Snipe, Redshank, Lapwing and, at the start of the study, a few Curlew. The site is also important for breeding Yellow Wagtail, a ground-nesting insectivorous passerine.

There has been a perceived overall decline in numbers of breeding waders on Tealham and Tadham Moors over the last 30 years (McGeoch, pers. obs.), which has been documented by surveys carried out by the Royal Society for the Protection of Birds (RSPB) (Round 1978; Weaver and Chown 1983; Robins 1987). Two main causes are cited for the decline. The National Farmers' Union (Gibson 1988) claims that an increase in predators such as Carrion Crow *Corvus corone* L., Fox *Vulpes vulpes* (L.) and Badger *Meles meles* (L.) has been the main cause of ground-nesting wader decline.

Over the last 30 years McGeoch has observed a decline in the duration of winter floods on Tealham and Tadham. Robins and Green (1988), using data provided by Wessex Water, have shown that between 1964 and 1987 the average drain height at which pumps are started has declined. Hancock (1989) has suggested that this results in fields drying earlier and staying dry later in the year. This reduction in field softness allows stock to graze the fields earlier, which has led directly to more nest trampling and also, by decreasing ground cover, has increased the availability of nests to predation (Green 1988). Earlier drying has also encouraged a change away from grass conservation by means of a summer hay crop in July, towards silage cutting in May and June preceded by rolling, with an obvious detrimental effect on ground-nesting birds. Beintema and Muskens (1987) report that, in Holland, maintaining a high water table in spring allows only slow growth of the vegetation, even on fertile soils. The late accessibility for livestock and machines enables waders to hatch their eggs safely in an area rich in food. There is also evidence of a vegetation change away from a species-rich wetland flora, productive in wet conditions, to a community more or less dominated by dry grassland species (Hill-Cottingham and Smith 1990; Bolas 1990), which is less productive (Hooghoudt 1950) and, once reseeded, less tolerant of flooding.

Water tables on the Moors are controlled by pumps operated by the National Rivers Authority. They act on behalf of the local drainage authority, the Lower Brue Internal Drainage Board, that sets summer (1 April to 30 November) and winter (1 December to 31 March) levels in the ditches on the Moors. In summer the ditches are kept water-filled to act as wet fences and to give drinking water for stock. However, the high summer levels in the ditches appear to have little influence on the water table in the fields, as the rate of hydraulic conductivity through the peat soils is low and is exceeded by transpiration. In winter the water levels are kept low, often resulting in empty field ditches, in order to achieve the maximum de-watering of wet or flooded fields, or to achieve the maximum reservoir capacity in advance of forecasted rain. Flooding occurs either when the River Brue, bankful from heavy rainfall and backed up by high tides, overtops on to the moor, or when it is bankful and the pumps cannot operate and so the water accumulates. In either case, as soon as conditions allow, floods are pumped off and ditches are very quickly drained.

Since the early 1980s, the Somerset Trust for Nature Conservation (STNC) has purchased 40 ha of grazing marsh concentrated in six blocks. This totals just under 5% of

the SSSI. These fields are managed by letting the grass keep to farmers. In order to give the maximum benefit to wildlife, the licences restrict grazing to between 1 June and 31 October, and hay cutting to after 15 July with after-grazing to 31 October. The hay fields may not be rolled or harrowed and the grazing fields may not be topped. No fertilisers, manures or pesticides may be used. The STNC does not undertake predator control. Traditionally, field gutters are dug in the fields to allow surface water to drain off. In order to keep fields as wet as possible, the STNC has blocked existing gutters and these blocks, combined with ditch spoil which has accumulated on the field edges, retain surface water on the fields for an extended period. In 1982 and 1984 two 30 x 30 m scrapes were dug to provide shallow water with a muddy margin throughout the year. Since 1989 water has been pumped on to some fields during dry periods in the winter.

## METHODS

Between 1984 and 1990 the numbers of breeding waders and Yellow Wagtail on the whole of Tealham and Tatham SSSI were counted. The standard British Trust for Ornithology methods for counting waders and passerines were used (Smith 1983). With these it was rarely possible to establish the breeding success of the birds, only attempted breeding. It did, however, establish their preferences for site selection, and it was possible to place the pairs on particular fields.

## RESULTS

The results were divided to show separately the use by breeding birds of STNC owned (40 ha) and non-STNC owned (819 ha) fields. Two fields, the first of 4.69 ha and the second of 2.43 ha, were not owned by STNC in 1984, but were purchased in 1985 and 1986 respectively. To keep the areas constant, these fields are treated as belonging to the STNC from 1984.

Table 1 shows the numbers of pairs of all waders on STNC owned and non-STNC owned land. The numbers of all waders using STNC land are also expressed as a percentage of the total. For all waders on STNC owned land the negative correlation ( $r = 0.51$ ) between numbers and time is not significant at  $P < 0.02$ . This indicates that there is no significant declining trend. For all waders on other land there is a negative correlation ( $r = 0.65$ ), significant at  $P < 0.02$ , which indicates that there is a declining trend.

**Table 1.** Number of pairs of all waders

Year	1984	1985	1986	1987	1988	1989	1990
Numbers of pairs on STNC land	11	19	20	22	12	17	10
Numbers of pairs on other land	44	34	17	21	22	15	15
Pairs on STNC land as % of the total	20	36	54	51	35	53	40

**Table 2.** Numbers of pairs of Snipe

Year	1984	1985	1986	1987	1988	1989	1990
Numbers of pairs on STNC land	8	12	16	19	11	15	9
Numbers of pairs on other land	12	15	9	11	11	5	2
Pairs on STNC land as % of the total	40	44	64	63	50	75	82

**Table 3.** Numbers of pairs of Yellow Wagtail

Year	1984	1985	1986	1987	1988	1989	1990
Numbers of pairs on STNC land	0	2	3	2	2	2	1
Numbers of pairs on other land	16	13	18	16	12	13	14
Pairs on STNC land as % of the total	0	13	14	11	14	13	7

**Table 4.** Waders breeding on a 7 ha STNC field in 1984 and 1985

	Lapwing	Redshank	Snipe	Total
1984	1	0	3	4
1985	3	2	4	9

Table 2 shows the number of pairs of Snipe on STNC owned land and on all other land. The former are also expressed as a percentage of the total. For Snipe on STNC owned land, there is no significant correlation ( $r = 0.43$ ) at  $P < 0.02$ , indicating that there is no significant trend. For Snipe on other land, there is a negative correlation coefficient ( $r = 0.84$ ), significant at  $P < 0.02$ , which indicates a significant declining trend.

Table 3 shows the number of pairs of Yellow Wagtail on STNC owned land and on all other land. The former are also expressed as a percentage of the total. Neither set of data showed a significant correlation ( $r = 0.11$  for STNC land,  $r = 0.21$  for other land) at  $P < 0.02$ .

Table 4 shows the number of waders attempting to breed on one STNC owned field in 1984, and again in 1985 after a new scrape had been constructed and field ditches blocked to make the field much wetter.

## DISCUSSION OF RESULTS

The results show a general trend of declining wader pairs on Tealham and Tadham SSSI from 55 in 1984 to 25 in 1990. At the same time, wader numbers on STNC land are broadly constant, but fluctuating around a mean figure of 16 (Fig. 1).

The initial decline in total wader pairs is partly a consequence of the hard winters of

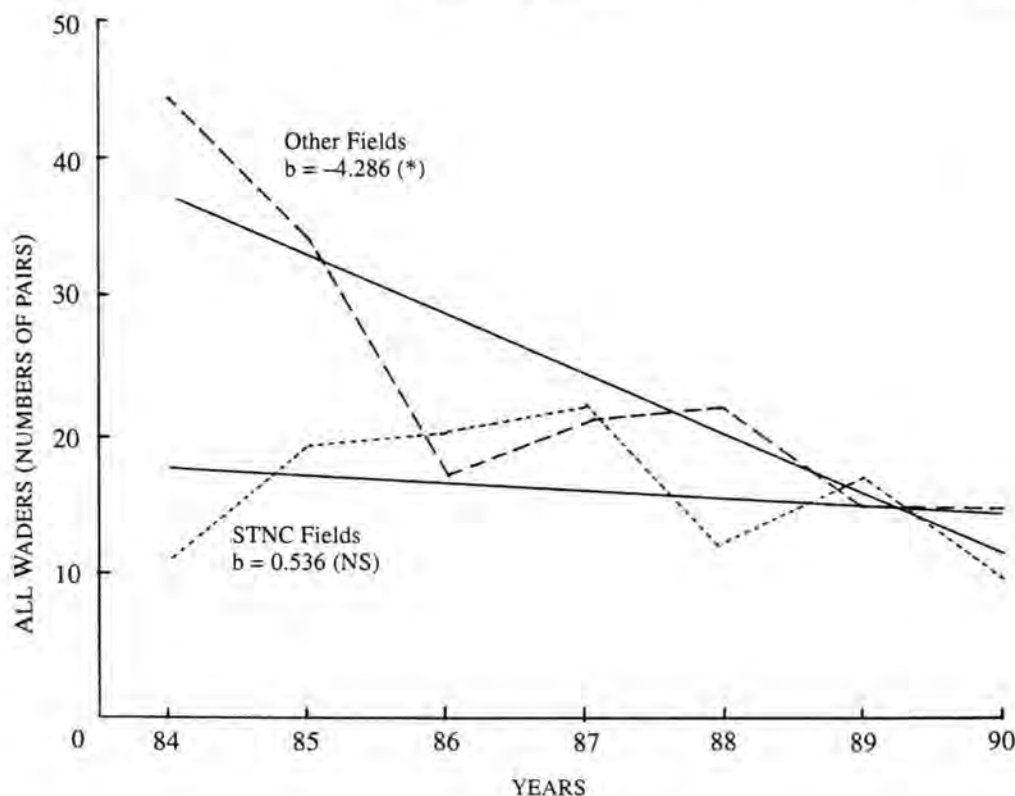


Fig. 1. Numbers of pairs of all waders breeding on Tealham and Tadham. (See key following Fig. 3)

1984–85, and especially 1985–86, after which much of the breeding Lapwing population failed to return. While the decline in all waders was temporarily reversed by an increased Snipe population in 1987, a combination of the Lapwings' breeding population failing to recover and a strong decline in Snipe numbers following two dry springs in 1989 and 1990 resulted in a continued decline in overall numbers.

A trend is less obvious for Snipe, with a general increase in numbers from 1984 to 1987 followed by a rapid collapse (Fig. 2). However, when the contribution made by the STNC land is removed, numbers again show a general decline, falling to near extinction in 1990. With the exception of 1988, the percentage of Snipe breeding on STNC land rose continuously. The trend is especially marked in the drought years of 1989 and 1990. In 1984, eight pairs of Snipe on STNC land made up 40% of the total, whilst in 1990, nine pairs made up 82% of the total. These figures strongly emphasise the declining importance of 95% of the SSSI for breeding Snipe, a wetland bird with a long bill that needs cover and soft ground near to the nest for feeding (Green *et al.* 1990).

There is considerable variation in field altitude within the Tealham and Tadham SSSI. As a result not all fields would be similarly wet and suitable for breeding long-billed waders. Of the whole Moor, about one third of the fields (273 ha) are potentially suitable,

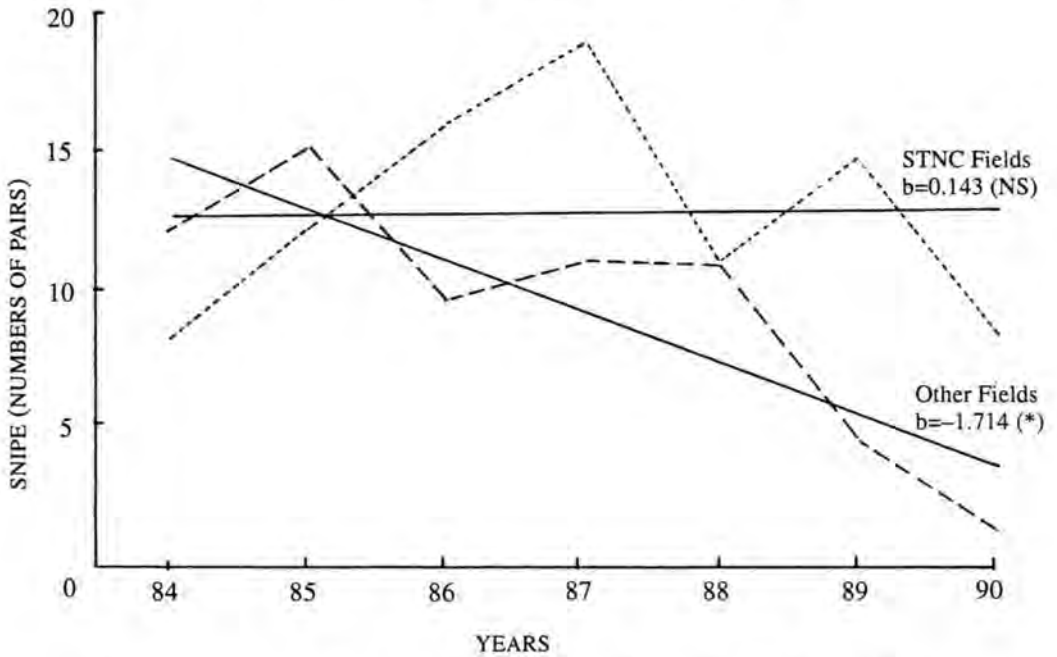


Fig. 2. Numbers of pairs of Snipe breeding on Tealham and Tadham. (See key following Fig. 3)

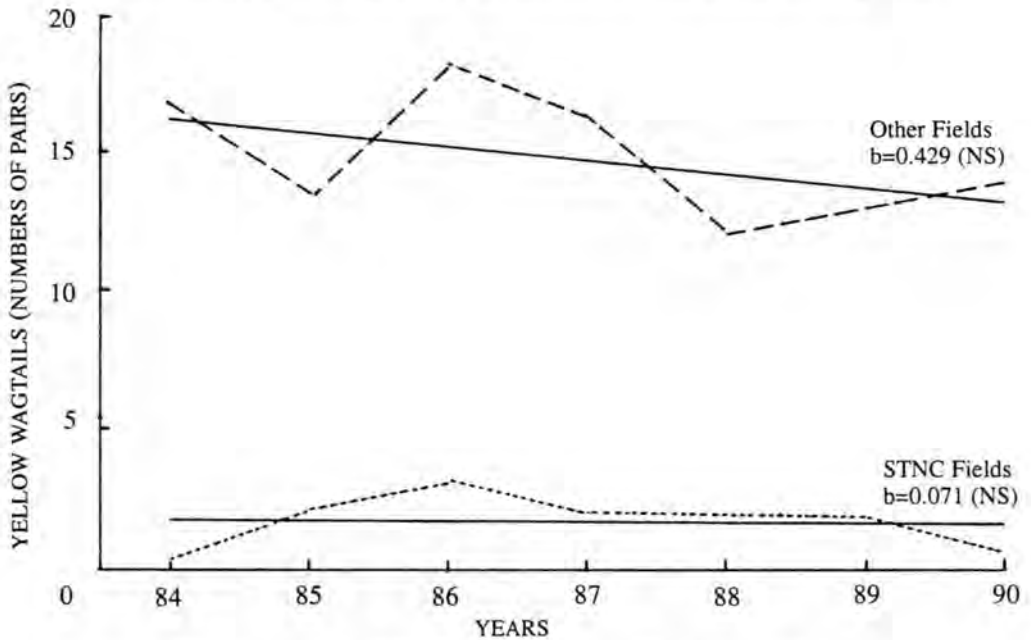


Fig. 3. Numbers of pairs of Yellow Wagtails breeding on Tealham and Tadham

Key to Figs 1–3: Dashed lines connect points representing *actual* total numbers of pairs in each year; solid lines represent linear regressions of numbers of pairs on time; *b* is the slope of each regression; (NS) indicates slope not significantly different from zero; (\*) indicates that probability of slope not differing from zero is less than 0.02.

while, of the STNC owned fields, two thirds (28 ha) fall into this category. Therefore, it would only be reasonable to expect 9–10 times the number of breeding long-billed waders on non-STNC owned land rather than the 20 times implied if the available habitat was evenly spread across the whole SSSI.

The number of Redshank pairs has remained constant throughout the period at 2–4 pairs. These will now only breed close to the scrapes on the STNC land where they bring their young to feed. A pair of Curlew bred on the SSSI until 1986, but not since then.

Yellow Wagtails have maintained a broadly constant breeding population throughout the period, with numbers fluctuating between 14 and 21 pairs (Fig. 3). On STNC land numbers have varied from 0–3 pairs, about 10% of the total population. While in terms of area available this averages about twice the expected percentage, it should be borne in mind that the vegetation on all of the STNC fields is both species-rich and is not cut or grazed early. Yellow Wagtails are ground-nesting passerines that require cover. They feed on flying insects and visually-available invertebrates but are not dependent on probing soft ground for their food (Cramp *et al.* 1988).

#### POSSIBLE CAUSES OF THE DECLINE IN BREEDING WADERS

##### *Increased Predation*

As it is clear that Yellow Wagtail populations have been approximately stable during the period and are spread more or less evenly between the two areas, it is also clear that predation is unlikely to have been a major factor in the decline of breeding waders, as Yellow Wagtails, similarly available to both air and ground predators, have not declined.

There is no documentary evidence that numbers of predators of eggs and chicks have increased, except for Mink *Mustela vison* Schreber, which now hold established territories over the whole SSSI. Badgers, often cited by farmers as the main culprits, have certainly increased in the surrounding Levels, colonising dry peat banks as large areas are drained and protected from flooding. As Badgers are not noted as systematic nest predators (Neal 1987), it seems likely that their increase and the waders' decline, although correlated, are not causally connected but each is a consequence of the lower water table.

There is evidence from Elliot (1982) and Robins (pers. comm.) that Lapwing and Snipe avoid nesting near trees, which provide perches and particularly nesting sites for Crows. However, Spray (1977) has shown that the total removal of territorial Crows from an area will result either in the immediate re-occupation of the territory by a new pair, or its use by a flock of non-breeding Crows which, although inexperienced, together can exert a much greater predator pressure on ground-nesting birds. Elliot (1982) has shown that Lapwings will co-operate in nest defence with reasonable success against a single Crow, but are completely overwhelmed by a flock attack. Redshank, and particularly Snipe, rely mainly on crypsis to prevent discovery and predation. Green (1988) has shown that initial nest predation by crows may be high but that, when clutches are relaid, predation is lower as predators have switched to an alternative source of food. In addition, growing vegetation will increase concealment. However, on Tealham and Tadham, except in the wettest years, the moors are now so hard by early summer that there is only minimal chance of chicks from relaid clutches finding sufficient soft ground for feeding to prevent starvation.

##### *Reduced Cover*

The problem of insufficient early cover on Tealham and Tadham is exacerbated on many fields not only by topping in the late summer, but also on many fields by 'following-on' with sheep grazing in the autumn and early winter. This leaves the fields so bald that

there is little use by overwintering Snipe and insufficient cover for early breeding by long-billed waders. However, as this form of field management is likely to suppress the Field Vole *Microtus agrestis* L. population on the Moor, the numbers of predators may be kept low. Beintema and Muskens (1987) have shown that predation on wader nests is greater following a collapse of Vole populations, making existing predators more reliant on other sources of food.

#### *Increased Dryness and Soil Hardening*

Evidence from STNC owned fields suggests that field wetness and the availability of suitable feeding areas for both long-billed breeding wader females and nidifugous chicks are of overriding importance. This was shown by the increased use of fields which had wet areas available, and the failure of birds to breed on fields without such areas. However, if this were the only reason, in a wet spring when special measures are not necessary to keep potentially suitable fields wet enough, it would be reasonable to expect a more even distribution of breeding long-billed waders closer to the expected ratio of 1:10 on STNC:other land. However, this is clearly not the case and a change in agricultural practice seems the most likely factor involved. Drier fields earlier in the spring have led to a change away from late grazing, June onwards, or a late hay crop, July onwards, to cattle grazing from April onwards and preparing fields for an early silage cut by rolling and harrowing, which thwarts most breeding attempts. Such management, often combined with summer topping of fields and followed by winter sheep grazing, leaves many potentially suitable fields devoid of nesting cover until spring management or grazing is started. In spite of it being possible to get on to many STNC fields early in the year, the more traditional management practices are maintained here, which allows waders to complete their breeding attempts.

There is now evidence from Bolas (1991) that existing drainage, further exacerbated by agricultural practice, is causing a long-term humification and hardening of the peat soil surface which is not readily reversible. Casual observations by Reid (pers. comm.) indicate that this process is also occurring on Tealham and Tadham Moors. If this is confirmed, it would provide a further mechanism whereby relatively small changes in drainage practice have, over time, a major impact on the breeding of waders.

#### MANAGEMENT IMPLICATIONS

Field management, while clearly important, is not in itself the answer, as dry fields managed traditionally are not used by breeding waders. If the decline in breeding wader numbers is to be reversed, clearly it will need a change in water management practice by the water authorities to ensure that potentially suitable fields remain sufficiently wet in the winter and early summer to prevent modern field-management practices. Although Tealham and Tadham Moors SSSI is of national and international significance, it seems likely that further compensation payments to farmers, either through the Ministry of Agriculture Fisheries and Food or English Nature, will be necessary in order to obtain the agreement of the majority of farmers to sanction such a change.

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A lifelong ornithologist, John McGeoch, MBOU since 1954, studied birds in Iraq whilst serving with the RAF as a dental surgeon. He was co-author of a paper on Iraqi birds and author of a second on the breeding birds in Iraqi Kurdistan. He moved to Somerset in 1955 and started recording the birds on the Levels. After 25 years as co-editor of the County Bird Report and a period as County Recorder, John retired as a dental surgeon in 1984 and was thus able to begin a more detailed study of the bird populations in the Brue Valley.