

## THE STATUS OF PARTRIDGES IN NORTH-CENTRAL FRANCE

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### ABSTRACT

REITZ, F. : THE STATUS OF PARTRIDGES IN NORTH-CENTRAL FRANCE. The partridge populations in North-Central France (Grey partridge, *Perdix perdix*, and Red-legged partridge, *Alectoris rufa*) have been continuously monitored since the beginning of the eighties. Therefore we can determine the evolution and the most recent values of:

- i. spring abundance indices of Grey partridges.
- ii. the actual spring densities in well-managed areas (i.e. with bag limits and sometimes habitat improvement),
- iii. reproductive success.
- iv. survival rate of adult Grey partridges.

Although high densities are still observed in some regions, nowadays tendencies mainly show a decline in Grey partridge densities essentially due to a decrease in the survival rate of adults.

### 1. INTRODUCTION

The management of entirely wild partridge populations is well-developed in North-Central France. It firstly consists in adapting the hunting pressure to game bird demography. In this way, spring counts of breeding pairs and brood sampling are performed each year to calculate hunting plans. Most of these data and several hunting bag data have been collected by ONC since the end of the seventies. It is therefore possible to get a rather good idea of the status of the partridge populations in the areas concerned and to estimate the recent trends in the variations of the determining demographic parameters, i.e. the annual adult survival rate and reproductive success. Most of these data concern the Grey partridge (*Perdix perdix* L.). However, since wild Red-legged partridge (*Alectoris rufa* L.) populations are also present in the southernmost monitored areas, some data on reproductive success are available concerning this species.

## 2. MATERIAL AND METHODS

The landscape of most of the monitored areas is flat farmland intensively cultivated to cereals and industrial crops (oilseed rape, sugar beets, potatoes, peas, sunflowers, maize, etc) with large fields, very few hedges and woods. However, where both partridge species are present, the landscape often is more diversified. The areas have a very variable surface ranging from 2 km<sup>2</sup> for private estates to more than 150 km<sup>2</sup> for areas managed by groupings of hunter associations. The partridge populations in all these areas are managed with bag limits. The habitat sometimes is also improved by predator control, management of set-aside fields for wildlife or artificial feeding of adults (cereal grains in troughs).

### Pair counts

Partridges are flushed by beating the whole areas (small ones) or samples of areas (biggest ones) in late winter or in the beginning of spring. The partridges are counted by observers posted all around the surface to be censused. When both species are present, the distinction is not systematically made nor possible, so the given results represent all partridges.

The abundance index was calculated as follows: for each year  $n$ , was calculated the mean pair density in the only areas (reference areas) for which all demographic parameters were known from spring  $n$  to spring  $n+1$  (sample size in **Table 1**). The index for each year was calculated by setting the value for 1990 at 100 and then by applying the ratios of mean pair densities for successive couples of years.

### Brood sampling

Broods are observed in many reference areas a few weeks after the cereal harvest. Observers are driving slowly a car along the paths and across the cropped fields to detect the broods. They determine for each brood, using binoculars and sometimes a telescope, the number of young and adults and the sex of Grey partridge adults. The number of observed broods (or birds for red-legged), sampled areas and concerned departements are given in **Table 1**.

Reproductive success is calculated as a young per hen ratio. This calculation assumes for the Red-legged partridge that males and females be in equal quantity (young per hen ratio = 2 x young per adult ratio).

**Table 1:** Sample sizes concerning brood sampling and the numbers of reference areas for the Grey partridge (areas for which all the demographic data are available from one spring to the next).

Year	Grey partridge brood sampling			Red-legged partridge brood sampling			Reference areas for Grey partridge <sup>i</sup>
	departements	areas	broods	departements	areas	observed birds	
1979	12	36	662				7
1980	14	58	914				24
1981	17	86	1603				37
1982	15	76	1840				25
1983	17	87	2541				28
1984	18	100	2774	from	13	938	0
1985	13	70	1885	4	18	1587	0
1986	16	106	2799	to	13	1413	0
1987	18	133	2690	9	15	2140	0
1988	18	151	3724	according	15	1814	18
1989	21	196	5845	to	33	3833	28
1990	21	224	8669	the	29	5489	25
1991	21	254	8469	year	21	3349	41
1992	21	280	8440		28	4174	62
1993	21	325	9339		20	4541	71
1994	20	297	7445		24	3093	81
1995	20	274	7430		44	3273	71
1996	23	319	8840		42	4778	56
1997	23	376	8261		42	3098	41
1998 <sup>ii</sup>	17	330	8790		31	2527	44

<sup>i</sup> year n-1 to year n

<sup>ii</sup> data collection for 1998 is not yet finished

### Adult survival rate estimates

The method has been explained elsewhere (REITZ, 1992). It is based on a demographic balance between two spring counts which takes into account the reproductive success and the hunting bag. The major assumptions are: i. an identical survival rate of young and adults after the brood sampling, ii. hunting mortality is additive since the calculation considers that 60% of the birds killed by hunting should have survived till the next spring.

These estimates could only be made for the Grey partridge since we have no valuable data for Red-legged partridge spring densities. They are not corrected for bird movements (emigration, immigration) so that they are only *apparent* survival rates.

Two successive annual estimates of the adult survival rate for one reference area are not totally independent because of the use of one spring count for both. Therefore, the trend in the mean survival rate was computed using each area's data only for one year out of two.

### **Relationship between Grey partridge reproductive success and climatic conditions**

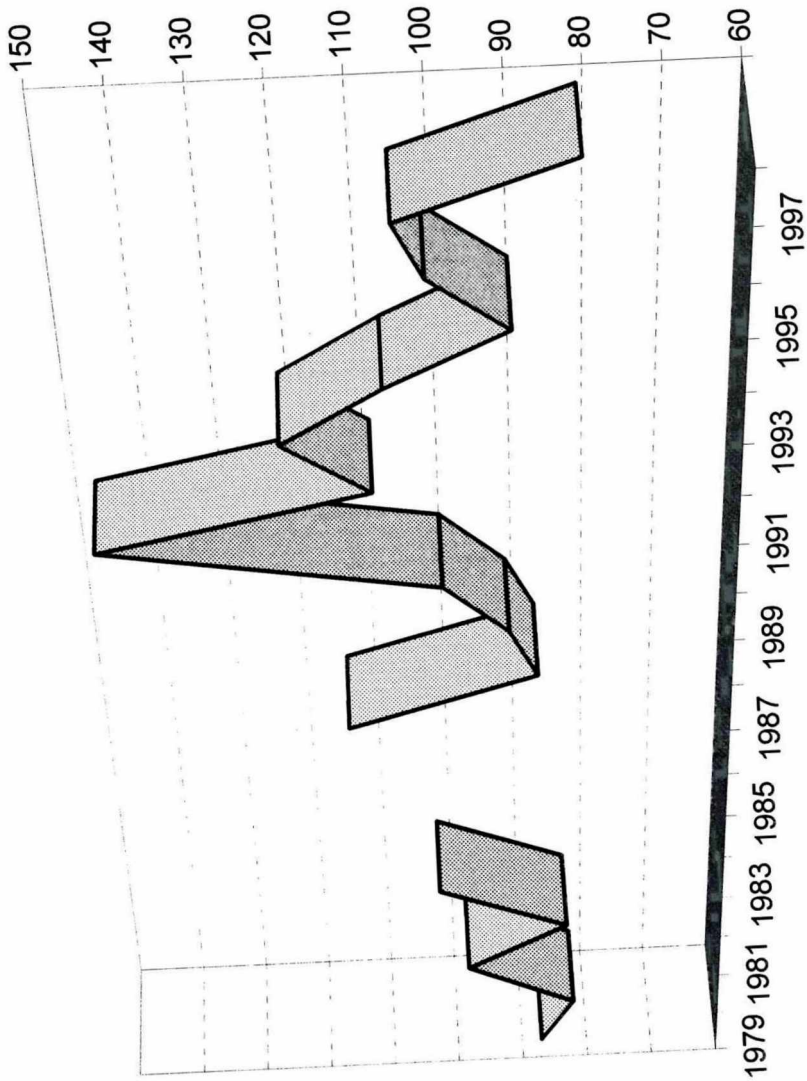
A regressive model had been developed to explain and predict the variations of the Grey partridge reproductive success by climatic variables (see REITZ, 1988). This model was updated with the most recent data using a stepwise regression model. The climatic data that were used (bought from METEOFRACTANCE) concerned the months of May, June and July and were the monthly mean or total of six parameters (lowest daily temperature, mean daily temperature, amount of precipitations, duration of precipitations, intensity of precipitations, i.e. the ratio of the quantity to the duration, number of days with more than 0.1mm of precipitations)

All statistics were performed with SPSS 7.5 for Windows software.

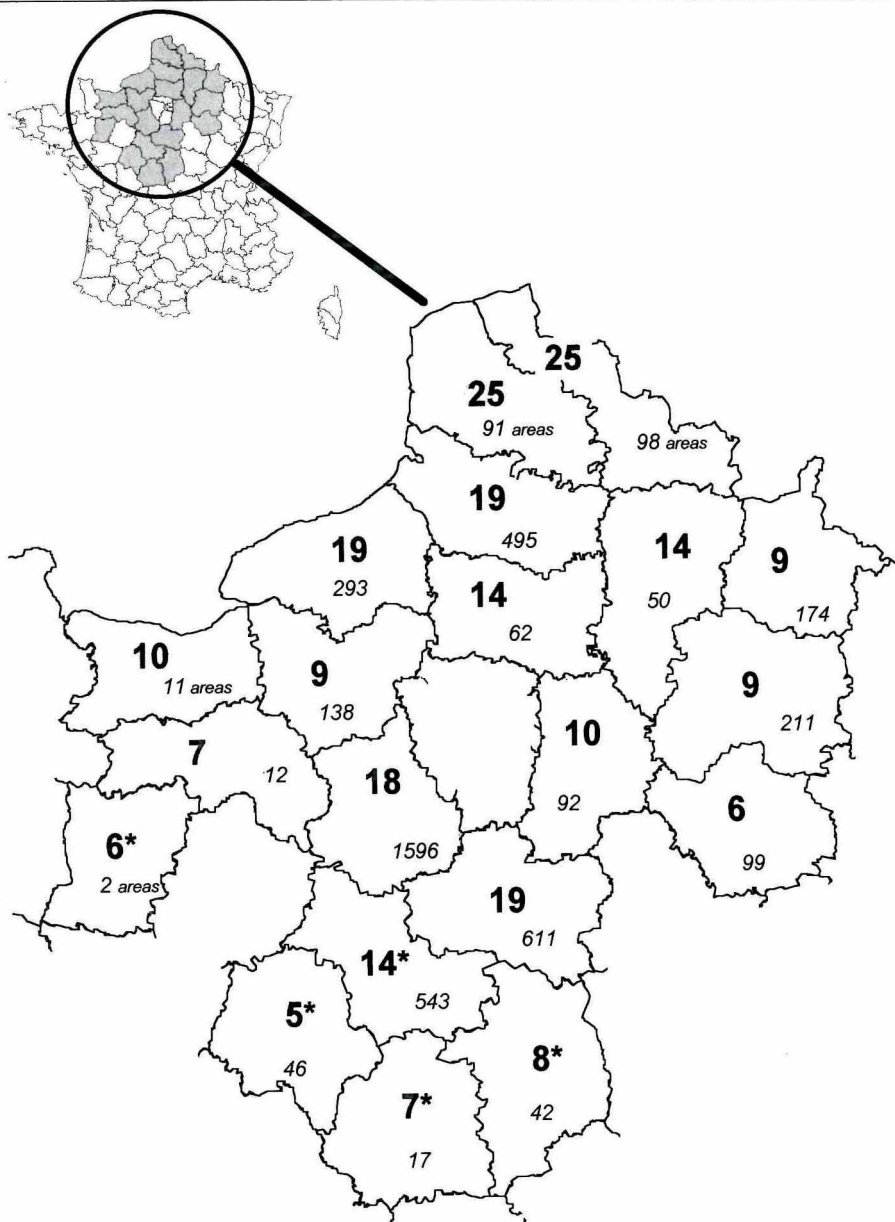
## **3. RESULTS**

### **Spring density**

The index of Grey partridge spring abundance shows high variations from 80 in the first years of monitoring to 150 in 1991 and back to 80 in 1998 (**Figure 1.**). So the present day status of the Grey partridge is not very favourable in spite of population management. However, the mean densities of breeding pairs are still rather high (**Figure 2.**): from 5 pairs per km<sup>2</sup> for both species together in the worst cases to 25 pairs per km<sup>2</sup> in the northernmost departements.



**Figure 1:** Spring abundance index of Grey partridges (set to 100 in 1990).



**Figure 2:** Mean 1998 spring density of managed populations in the departements of northern France: number on green background=number of breeding pairs of only grey or \*Grey and Red-legged partridges per km<sup>2</sup>, number in italics=censused surface (in km<sup>2</sup>) or number of censused areas when specified

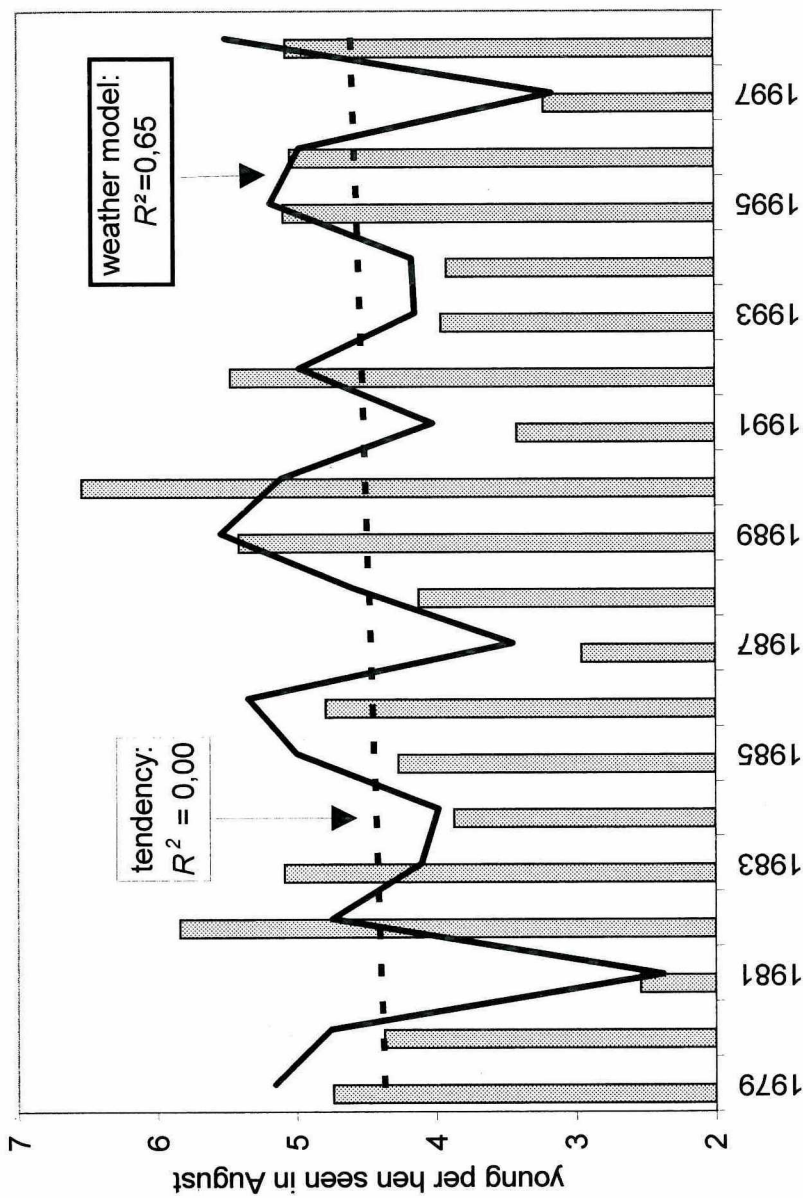


Figure 3: Reproductive success of Grey partridges.

## Reproductive success

### *Grey partridge*

The mean reproductive success of the Grey partridge over the last twenty years is 4.5 young/hen (min: 2.5 in 1981, max: 6.5 in 1990, **Figure 3**). There is no tendency toward a decrease during this period ( $P=1.0$ ). The major part of the variations can be explained by the conjunction of two climatic parameters: the duration of precipitations in June and the number of days with precipitations of more than 0.1mm in May ( $P<0.001$ ).

### *Red-legged partridge*

Data have been collected only since 1984. The reproductive success of this species has always been much lower than that of the Grey partridge except in 1987 (however, for this year, the limitation of the Grey partridge data set to the region where the Red-legged partridge is present, would have restored a difference in favour of the Grey partridge). The average value is 2.6 young per hen with a minimum of 1.2 in 1994 and a maximum of 4.4 in 1990 (**Figure 4**). There is a slight but not significant tendency to decline ( $P=0.11$ ).

### Game bag

The mean Grey partridge bag in the reference areas varied from 1 partridge/km<sup>2</sup> in 1987 to 20 partridges/km<sup>2</sup> in 1982 and 1990 with an average value of 10 partridges/km<sup>2</sup> (**Figure 5**). Since 1992, it has in average never exceeded 15% of the estimated autumn population (by reference to the next spring count and considering a natural mortality rate of 40% during winter).

### Annual survival rate of adult Grey partridges

This is the most worrying demographic parameter since it is subject to a highly significant tendency to decrease (**Figure 6**,  $P<0.001$ ). At the end of the seventies, about one bird out of two did survive from one spring to the next. Nowadays this is only the case for one bird out of three.

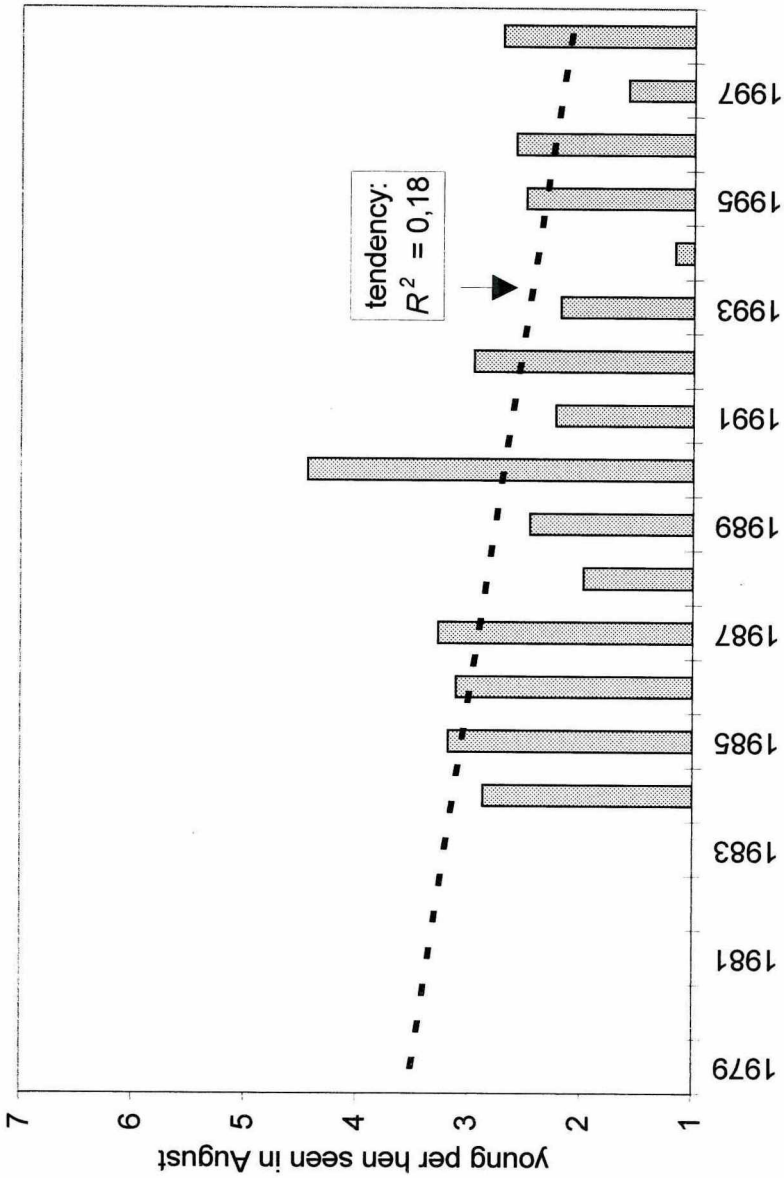


Figure 4: Reproductive success of Red – legged partridges.

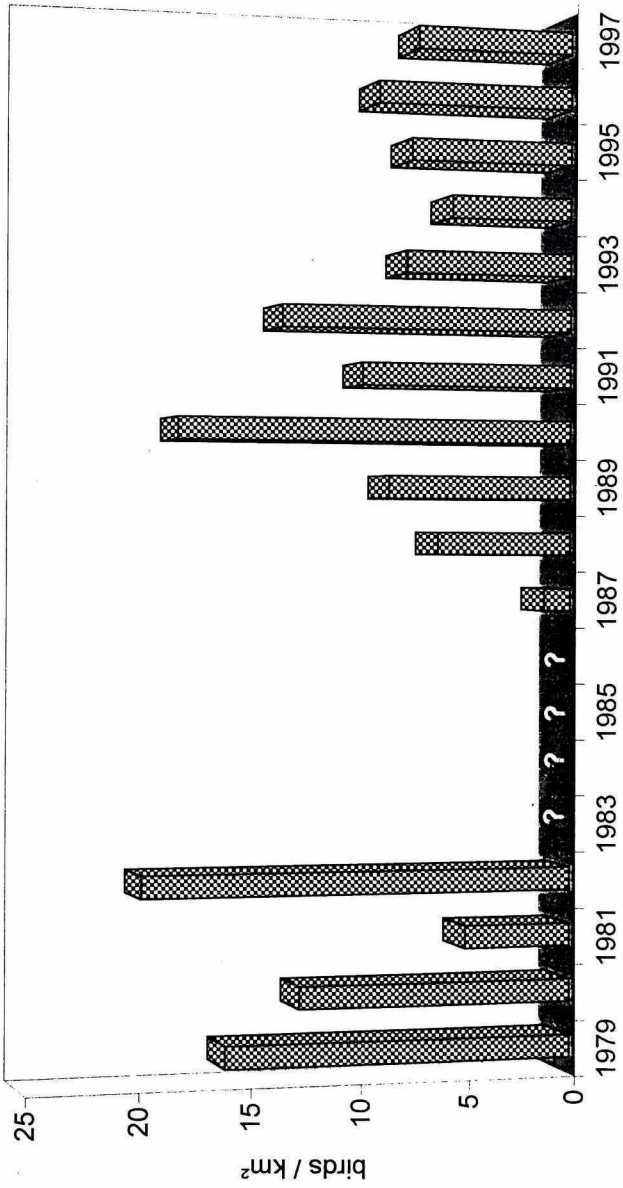


Figure 5: Mean hunting bag of wild Grey partridges collected in reference areas.

## 4. DISCUSSION AND CONCLUSION

In spite of a good management of the partridge populations, Grey partridge densities have been regularly declining since 1991. The game bags have been greatly reduced to preserve the spring stocks but this apparently is no more sufficient. The highest densities are now recorded in the northernmost areas and not in the Beauce region which for a long time has been considered the « bastion » of the Grey partridge in France. If the reproductive success fluctuates with climatic conditions but does not show a trend to decrease, this is not the case of the adults survival rate. Explanations for this can be the regression of landscape diversity with lesser and lesser cover for brood protection in autumn and winter and/or a highly probable increase in the abundance of adult partridge predators (foxes, mustelids, feral cats and harriers).

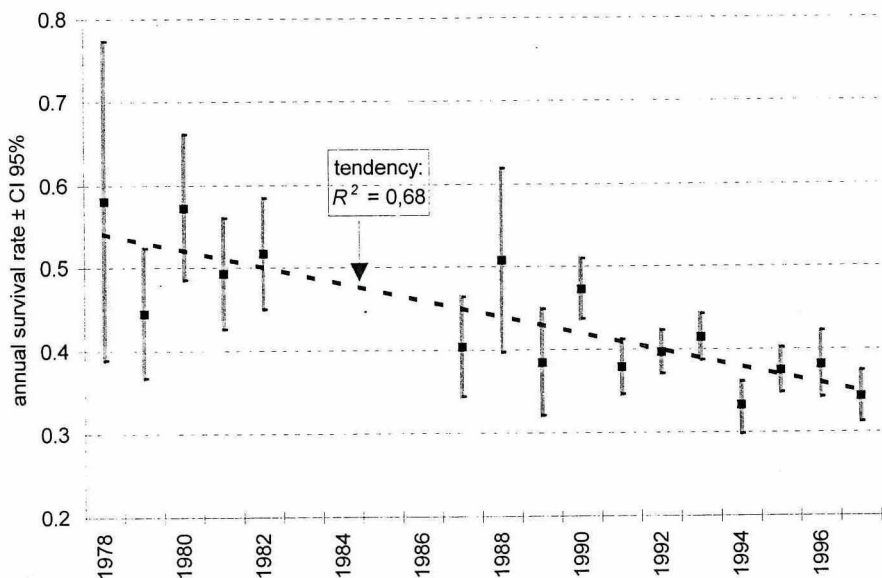


Figure 6: annual survival rate of adult Grey partridges from spring  $n$  to spring  $n+1$  (hunting mortality excluded) with confidence interval at  $P=0.05$ .

A very large study was carried out from 1995 to 1997 to improve our understanding of the Grey partridge situation in France (see BRO *ET AL.*, 1998).

The population trends of the Red-legged partridges are still very imprecise. However, the persistence of this species in the centre of France, in spite of a very low reproductive success, supposes that the adult survival rate is much higher than in Grey partridges. If we might conclude by a rapid international comparison, we should say that the situation of the Red-legged partridge in the Centre of France seems to be quite similar to that of the Grey partridge in England (lack of good nesting habitat and low survival rate of the chicks, POTTS, 1986) while the situation of the Grey partridge in the intensive farming regions of the Centre-North of France evokes, although in a very different habitat, the problem of grouse management in Scotland (heavy mortality in adults due to predation, REDPACH AND THIRGOOD, 1997).

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## REFERENCES

- BRO, E., REITZ, F., MAYOT, P. and MIGOT, P. (1999): Environmental correlates of the demographic pattern of declining populations of Grey partridge in France. *In*: FARAGÓ, S. (Ed.): *Perdix VIII Proceedings, Hungarian Small Game Bulletin 5*: :
- POTTS, G.R. (1986). - *The Partridge*. Collins, London, 276 p.
- REDPATH, S.M. and THIRGOOD, S.J. (1997) : *Birds of prey and Red grouse*. London: Stationery Office, 148 pp.
- REITZ, F. (1988): Un modèle d'estimation de la réussite de la reproduction de la perdrix grise (*Perdix perdix* L.) à partir des conditions climatiques. *Gibier Faune Sauvage 5*: 203-212.

REITZ, F. (1992): Adult survival and reproductive success in abundant populations of Grey partridge (*Perdix perdix*) in North-Central France. In BIRKAN, M., POTTS, G.R., AEBISCHER, N.J. and S.D. DOWELL, S.D. (Eds.): *Perdix VI*, International Symposium on Partridges, Quails and Francolins, *Gibier Faune Sauvage* 9: 313-324.