

Recent trends in the number of hunters and the harvest of wildfowl in the Camargue, France: preliminary results

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Abstract

In 1999, the Office National de la Chasse et de la Faune Sauvage (ONCFS) made a detailed survey of hunting activity in the Camargue, southern France. A full inventory of the Camargue shooting estates was recorded and a questionnaire on hunting practices was completed for each of these estates. The number of hunters on communal and company estates has declined considerably in recent years, whereas the number of hunters on private estates has remained stable. Between 1999 and 2008, managers from 105 of the private shooting estates voluntarily sent the estates' bag statistics to ONCFS, with 35 of these private estates additionally providing data from 1992 onwards. Trends in the bag records for different duck species on the 35 estates with longer-term data are compared with the recent trends in wintering numbers for the same species in the West Mediterranean region. A simple bag return form has been given to 2,000 hunters on communal and company shooting estates since 2004. The voluntary return of these forms to ONCFS is still rather low with c. 5% returned in 2008–2009, but is steadily increasing.

Key words: Anatidae, hunting statistics, Mediterranean wetlands.

Hunting bag statistics remain relatively scarce in France. Only three complete national surveys have been achieved and published (in 1974, 1983 and 1997) by the Office National de la Chasse et de la Faune Sauvage (ONCFS), the government organisation responsible for research and monitoring of game and control of hunting in France. These surveys were based on a

questionnaire sent by mail to a random sample of hunters within each département, the 95 administrative units of France. The survey was not extended to the overseas territories. Surveys were made at the département level because the local authorities are responsible for issuing shooting licences before the start of each hunting season. Annual licences are

compulsory for any type of shooting in France, and can be purchased either for one or two départements or for the whole of the country. The results therefore are difficult to interpret in relation to the natural landscape. For instance the Camargue, a 150,000 ha wetland complex on the Mediterranean coast, composed of natural, semi-natural and cultivated habitats, is included within two départements. Furthermore, because there was some slight variation in the methods used in each of the surveys, and confidence intervals for the total bag estimates were very large, assessments of the number of duck bagged in the Camargue over time are rather tentative. The results of the three surveys do, however, suggest a strong decline in the number of duck harvested in the two departments covering the Camargue; 44% fewer birds were taken in 1997 compared with 1974 (ONCFS 1976; Trollet 1986; Mondain-Monval & Girard 2000). This may partly reflect a 13% reduction in the length of the hunting season; there has been no shooting in France in March since 1979. Moreover, the total number of hunters registered in France has declined considerably, and in the two départements concerned the number of hunters decreased by 37% over this period (ONCFS unpubl. data). The wildfowling season in the Camargue was further shortened from 2000 onwards, opening one week later (on 21 August) and closing at the end of January/beginning of February instead of at the end of February.

Shooting in the Camargue can currently be practised over *c.* 71% of its natural and semi-natural habitats. It mainly takes place on three different types of land tenure:

private land, communal and company estates. On private land (*c.* 36% of the Camargue's natural or semi-natural wetland habitats) the landowner can either hunt himself with friends or relatives, or lease his shooting rights to a small group of other hunters (organised as a club) generally of 3–11 individuals. The cost of the lease varies with the quality of the estate, but may reach several thousand Euros per hunter per season on the best estates (Mathevet & Mesléard 2002). On communal shooting grounds (*c.* 20% of the Camargue's wetland habitats), hunters have to live within the administrative area of the commune (*i.e.* the village or area surrounding the city) and pay a contribution to a communal association or society. On the estates of big companies, for instance those involved in salt production (*c.* 8% of the Camargue's wetland habitats), hunting is practised by employees. Here hunters are also organised into specific hunting associations or committees. On the communal and company estates, individual annual fees are generally low (tens of Euros). For all three types of estate, hunters also have to purchase a shooting licence (tax) each year, amounting to *c.* 100 Euros. A hunter can belong to more than one association, society or private club.

The Camargue has been designated by the French Government as a Wetland of International Importance under the terms of the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the "Ramsar Convention"). Monitoring the level of hunting activity therefore is important for maintaining the wetland for waterbirds, but the way in which the administration of

hunting in France is organised makes it difficult to assess the true number of hunters in the Camargue alone. In 1999 ONCFS launched a monitoring programme specifically designed for the Camargue, which included making a complete inventory of the Camargue's hunting estates (Mondain-Monval *et al.* 2005). The aims of this programme were: 1) to design and implement an accurate monitoring system for detecting trends in hunting activity (number of each species per bag, number of hunters, number of shooting days, etc.) in the Camargue, 2) to draw the attention of hunters and their representatives to the necessity of monitoring hunting bags and other effects of hunting on waterbird populations if sustainable management of wildfowl populations is to be effective, and 3) to ensure the voluntary participation of as many hunters as possible and develop a flow of information between ONCFS and participants (*i.e.* encourage a participative approach).

This paper describes recent trends in waterbird numbers recorded in bag statistics specific to the Camargue and also provides preliminary information on the level of hunting activity recorded at the site.

Methods

Number of hunters

The number of hunters registered in the two départements covering the Camargue, recorded each year since 1973 (the year in which hunting licence data were first available at the département level), was obtained from the hunting licences database which is collated and managed by ONCFS.

Two different methods were used to assess the number of hunters in the Camargue alone, depending on the tenure of the land. The total number of communal and company hunters was determined by surveys made through direct contacts with the 12 communal and three company hunting associations (with which the hunters have to register), first in 1999 and then each year from 2004 onwards. The number of private hunters at the 205 private hunting estates identified was assessed in 1999 using a questionnaire survey, completed by ONCF staff together with the hunting club manager or the land-owner, either through direct contact or by telephone (ONCFS unpubl. data). The same methods are currently being used to update the 1999 assessment.

Bag statistics

Following the 1999 survey, managers of up to 110 private hunting clubs or estates were met progressively and asked to become involved in monitoring hunting activity in the Camargue. Managers were initially approached at random and then through contacts made in the hunting community, focusing first on the most important estates in terms of annual bag or surface area. The sample cannot therefore be considered to be truly random, but the intention is to collect data from all private estates in the medium term. Managers were asked to provide for each season the total bag per species on their estate (site based data), the number of shooting days, the number of hunters involved, the surface area of the estate and, if game species were released, the number and species of birds released. Because some

estates had a tradition of keeping bag records, managers were also asked to provide earlier bag statistics where these were available. Bag data from 1992 onwards were available for 35 of the 110 private estates, but only *c.* 66% had recorded precisely each year the numbers of shooting days and active hunters, with the remainder providing only estimates. Trends in the number of birds of each species recorded in the hunting bags on the private estates were analysed using TRIM software (Pannekoek & Van Strienen 1998). Out of the 110 estates contacted, only five did not wish to participate in the programme.

A programme monitoring the bags of hunters on communal and company estates commenced in 2004, based on information provided by individual hunters. A simple bag return form was given each year to 2,000 communal and company hunters in the Camargue on issuing or renewing their local licence. Returning the form to ONCFS was not a pre-requisite for subsequent renewal of permission to shoot on the communal or company estate. Hunters were asked to report their bag per species, their number of shooting days and to indicate the society or association to which they belong.

Results

Trends in the numbers of hunters

There was a significant decline over the years 1999–2008 in the total number of hunters registered in the two départements covering the Camargue ($R^2 = 0.9655$, $P < 0.0001$). The number of communal hunters recorded in the Camargue itself declined by about 22% over the same period (Fig. 1). In

2008 there were *c.* 2,930 communal hunters in the Camargue, substantially fewer than an estimated 6,000 communal hunters in the 1970s (Tamisier & Dehorter 1999). The number of company hunters has also declined, from 320 individuals in 1999 to 224 in 2006. About 1,200 hunters were recorded using the private estates in 1999. Of the 105 estates visited both in 1999 and in winter 2008/09 hunting has stopped at three of them, but since these estates remained in private hands hunting could resume there in the future. Two of the 105 private estates are now leased by communal hunting associations, and are therefore currently classed as communal shooting grounds. On the remaining 100 estates where no change in the organisation of hunting occurred, the total number of private hunters has remained stable overall, despite variation on the individual estates, with *c.* 740 hunters reported in 1999 and 720 in 2008.

Bag statistics: communal and company hunters

Because of the low number of respondents, data from communal and company hunters were considered together. Although steadily increasing with time (2% of 2,000 forms issued in 2004 were returned, 1% in 2005, 3% in 2006, 4% in 2007 and 5% in 2008), the return rates for the hunting bag forms were low and reached only 5.2% (of 2,000 forms issued) in 2009. The analysis of the 223 hunting bag forms received during the 2004–2008 period indicated that 35% of the hunters did not shoot any duck. The average number of ducks shot per hunter per season over this period (including those

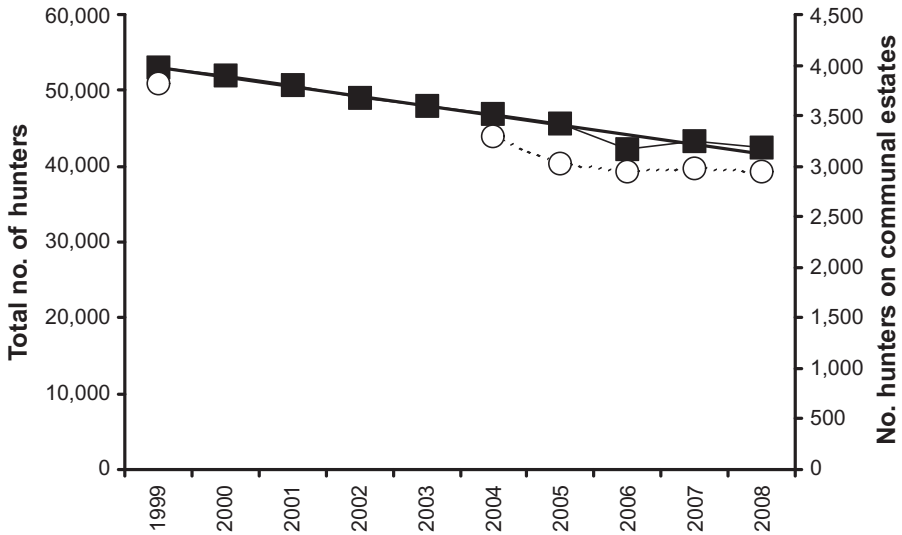


Figure 1. Trends in (a) the total number of hunters on the Camargue and its surrounding areas (*i.e.* within départements 13 and 30) since 1999 (left y-axis labels; black squares and plain line; $y = -1,272.1x + 54,350$, $R^2 = 0.9655$, $P < 0.0001$), and (b) the number of hunters on communal estates on the Camargue in 1999 and from 2004 onward (right y-axis labels; circles and dotted line).

that did not shoot any duck) was 10.6 birds (s.d. ± 20.6 , range = 0–156 birds), and the average number of shooting days per hunter was 27.4 days (s.d. ± 23.1 , range = 0–163 days). However, because of the small size of the sample, these results should be considered with caution. In particular, as it was a voluntary system, the most passionate hunters are probably over-represented. Due to a lack of earlier data on the hunting activity of communal and company hunters, and also to the small proportion of hunting bag forms currently being returned, it is not possible to assess any long- or medium-term trends in the size or composition of the hunting bag for this group. In the near future, the priority will be to design a more robust sampling

strategy, in agreement with the hunters' associations.

Bag statistics: private hunters

The number of private shooting estates participating to the programme has increased gradually since 1999, stabilising at around 80 estates since 2005. The average number of participating estates over the years 2004–2008 was 76. New private estates did participate each new season, but conversely a few estates did not send their bag data for all years. A total of 93 private estates have sent their bag statistics to ONCFS at least once during the 2004–2008 period and 105 during the period 1992–2008. Reasons for an estate manager or owner not sending in his bag statistics

each year are diverse, including a change of owner or manager, illness, loss of the data book, lack of motivation, and transformation of the estate into a non shooting area.

The average numbers shot per year over the past five years on the 93 estates was about 41,000 duck, mostly of eight different species (Fig. 2), and also 6,000 Coot *Fulica atra*. The average number of ducks shot/hunter/season on the 93 estates was 72 birds (s.d. \pm 55 birds, $n = 525$ hunters) over the winters 2004/05 to 2008/09. On these estates, the average number of shooting days (*i.e.* with at least one hunter present) was 41.5 days (s.d. \pm 23.6) per season, a bit less than 2 days of shooting per week.

Hunting bag data since 1992 are available for 35 of the private estates. Trends in the numbers of particular species and of all duck taken therefore were calculated for

the years 1992–2008, using TRIM software to adjust for the few missing values. Over this 17-year period (Fig. 3), the number of ducks bagged each year has remained stable for all species (Pintail *Anas acuta*, Teal *Anas crecca*, Gadwall *Anas strepera*, Wigeon *Anas penelope*, Shoveler *Anas chrypeata*) except for Mallard *Anas platyrhynchos* ($R^2 = 0.462$, $P < 0.003$) and Red Crested Pochard *Netta rufina* ($R^2 = 0.866$, $P < 0.001$) whose numbers shot have increased, and for Pochard *Aythya ferina* ($R^2 = 0.376$, $P < 0.01$) and Coot *Fulica atra* ($R^2 = 0.753$, $P < 0.001$) whose numbers shot have declined.

A hunting pressure index was calculated for each season and each estate by summing the number of hunters present on each shooting day. TRIM indices for these figures (number of hunters * days) showed a significant decline ($R^2 = 0.621$, $P = 0.0002$), most probably due to the shortening of the season.

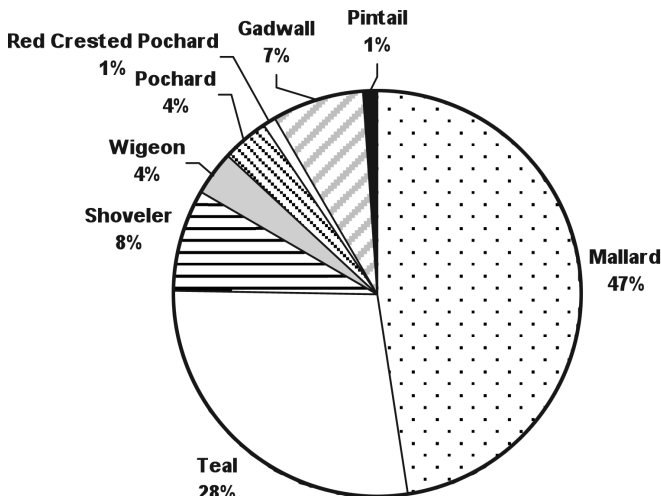


Figure 2. Percentage of each species recorded in duck bags from 2004–2008 inclusive.

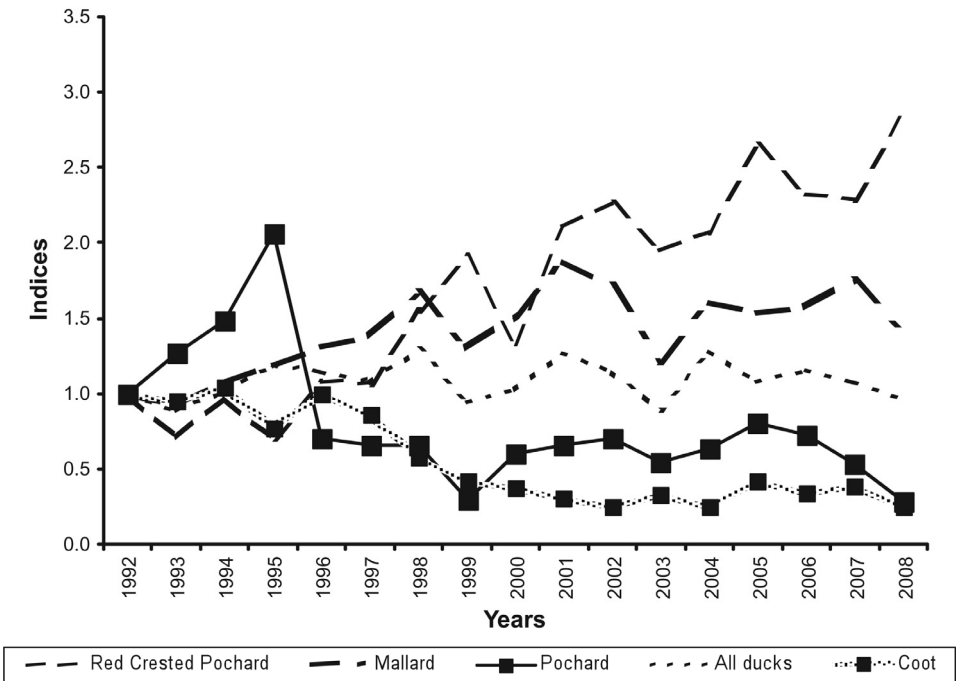


Figure 3. Trends in hunting bags (indices, with missing values imputed using TRIM analysis) for Mallard, Pochard, Red-crested Pochard, all ducks species, and Coot recorded at 35 private shooting estates on the Camargue from 1992–2008.

Discussion

The general decline in the number of hunters in the départements covering the Camargue involves both the communal and company hunters. The main reason for this decline is thought to be the lack of recruitment of young hunters, primarily for sociological and economic reasons (Havet *et al.* 2007). In the Camargue, a large proportion of the communal and company hunters (in this study 37% in 2008/2009) usually do not shoot wildfowl but are more likely to hunt terrestrial game, of which Rabbit *Oryctolagus cuniculus* used to be the

favourite quarry species. A recent dramatic decline in Rabbit numbers in the Camargue due to the spread of the Myxoma virus and, more recently, of the Viral Haemorrhagic Disease (ONCFS unpubl. data), is also likely to have had a strong influence on the hunters' decision to stop shooting.

Preliminary data indicate that numbers of hunters on the private estates have not shown a similar decline, at least in the Camargue where the demand for high quality wildfowling opportunities apparently still exceeds the supply. However, indications from landowners that they may convert the least “interesting” private

shooting grounds to crop production, to take advantage of the recent increase in cereal prices, could change this situation if the prices remain high. This may result in an increase in leasing prices for the remaining wildfowling estates, and could also lead to an increase in hunting pressure in some areas if more hunters occur on these estates due to reduced wildfowling opportunities elsewhere.

Trends in the numbers of duck recorded in winters 1992–2008 in bags from a sample of 35 private hunting estates were stable for most species, despite a very recent but gradual shortening of the shooting season (*e.g.* no shooting in February since 2000). These results can be compared to the recent (1996–2005) trends in the numbers for wildfowl wintering across the West Mediterranean region (Delany *et al.* 2008). Over this period, the bag indices for Wigeon, Gadwall, Teal, Pintail, Shoveler were stable whilst all the January count indices for these species increased. Bag indices for Mallard and Red Crested Pochard increased as did the count indices. Pochard is the only common quarry duck species showing a decline both in the Camargue hunting bags and also in the West Mediterranean wintering numbers. The trend in the bag of Coot conversely showed a sharp decline despite there being a moderate increase in wintering numbers in the region. This discrepancy might be due to the particular way of hunting Coot in southern France (with rowing boats), which tends to be less practised than in the past, although it is still very popular in a few places.

Aerial counts made of duck wintering

in the Camargue similarly indicate that, except for Pochard and Tufted Duck *Aythya fuligula*, most species have been more numerous in recent years than in the 1990s (Gauthier-Clerc, pers. comm.). The finding that the annual bag has remained constant for most species, despite an apparent reduction in hunting pressure, may therefore be due to the increase in the wildfowl populations in the whole region and in the Camargue providing more opportunities for those still hunting to harvest the birds over a shorter period. Reasons for the increase in numbers are unknown and certainly difficult to appraise, but might include climatic factors as well as improved management measures (such as creation of sanctuaries, marsh management and shortening of the hunting season) across the whole region. The decrease in Pochard numbers should be investigated in further detail to identify the reasons for its decline and to suggest appropriate conservation measures. The creation of sanctuaries designed for improving its wintering conditions, particularly its nocturnal feeding grounds in the Camargue, is one measure that could be implemented in the near future (Brochet *et al.* 2009).

Up to now, both hunting bags and land management practices have remained cryptic and little known except to staff of the hunting estates. This study represents a first attempt at monitoring trends in the wildfowl harvest in the Camargue, which is one of the most important wildfowling areas in France. Along with the traditional breeding of Camargue bulls, hunting is one of the most important financial and social activities in the region, and is one which

does not require major transformation or destruction of the natural ecosystem. Camargue wetland habitats therefore can have a real economic value in themselves, which helps to ensure their conservation for the future. This also makes hunting one of the most potentially sustainable activities locally. In order to assess its sustainability, its environmental costs and benefits must be monitored. The most important environmental cost of hunting is the impact of the wildfowl harvest, which must be estimated from local bags in relation to the abundance of wildfowl, both in winter and during the migration seasons.

Despite the improvement in knowledge regarding the hunting bags of the private estates in the Camargue, much still remains to be learnt about the communal and company hunting estates. If proper management of the wildfowl populations is to be achieved, raising awareness amongst the hunting community of the importance of accurate hunting bags and the effects of hunting pressure will be crucial in the coming years. A fuller assessment of the impact of hunting then should be possible. In particular, further research is needed to determine more completely the annual hunting bags of all quarry species and their populations in the Camargue.

Natural habitats used as hunting grounds in the Camargue contribute to overall biodiversity at the site and need to be recognised as areas of conservation value. The added value of these hunting grounds to the overall conservation value of the Camargue therefore should also be assessed, and the potential impacts of converting shooting grounds to arable or agricultural

land in the Camargue's biodiversity should be investigated as a matter of some urgency.

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