Giant Schnauzer Breed Surveillance in the UK – (Year 2000 To 2019)

Updated 2020

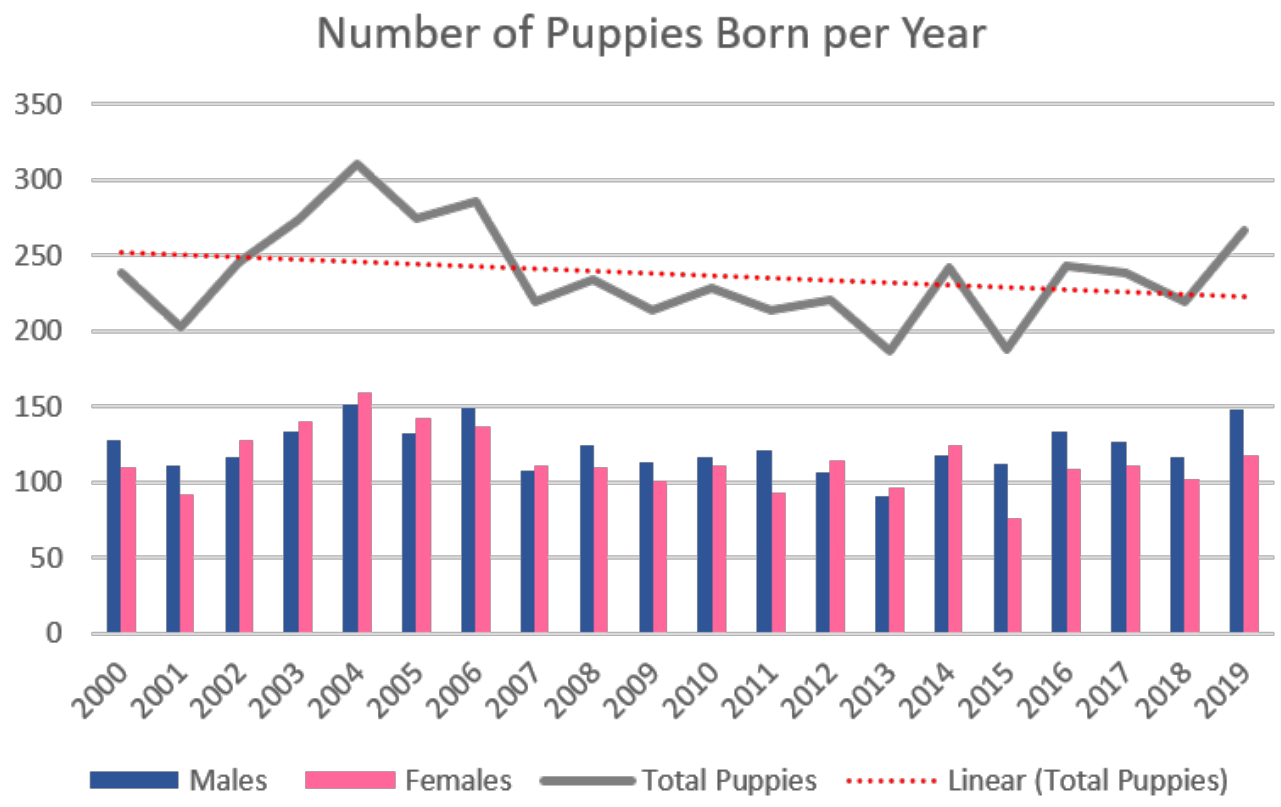
Breed health surveillance is an essential part of health planning for the future of a breed and monitoring underlying trends is one of a number of different ways that potential health problems may be highlighted. In addition surveillance may also demonstrate improvements and uniformity in a breeds health status. Analysis of information such as the number of litters, puppies and average litter sizes can provide useful information, e.g. a decrease in litter size and number of litters could raise suspicions of conditions associated with infertility. Also monitoring the overall breeding population is key to determining a breeds sustainability into the future. Monitoring issues such as the average inbreeding coefficient can go towards determining and improving genetic diversity.

The Kennel Club (KC) recommend that breed clubs should undertake continuing breed health surveillance as part of an overall strategy to develop and maintain health improvements within a breed.

The following information provides an annual breakdown of some of the fundamentals associated with Giant Schnauzer puppies born and registered with the Kennel Club in the UK since the year 2000. All graphs and data are centred around information recorded in the UK Kennel Club Breed Record Supplement (KC BRS), and inbreeding coefficients are based on those provided by the KC's Mate Select system.

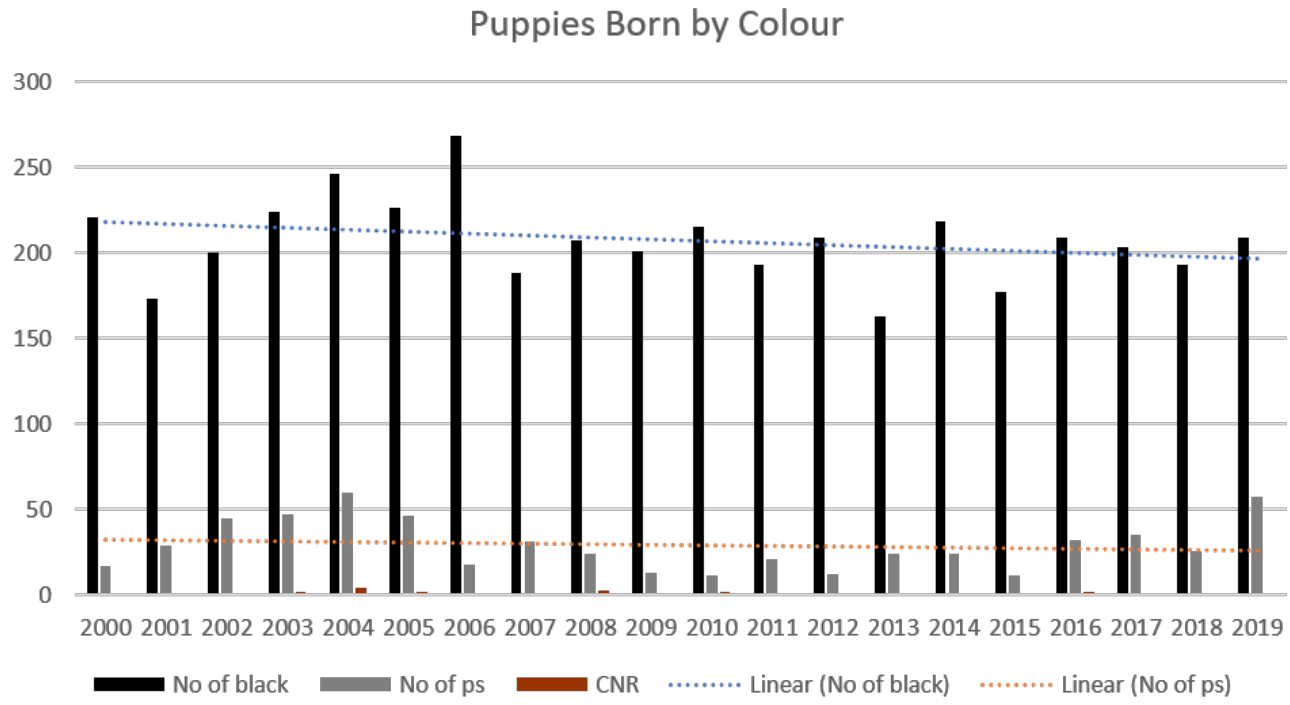
Puppies Born and Registered Per Year

Graph 1 below shows the number of male and female puppies born in the UK per year and registered with the UK Kennel Club. The graph includes a trend-line that demonstrates an overall gradual decrease since 2000. On average the number of puppies has gone down by 11% over the last 19 years, although the number of puppy registrations increased during 2019.



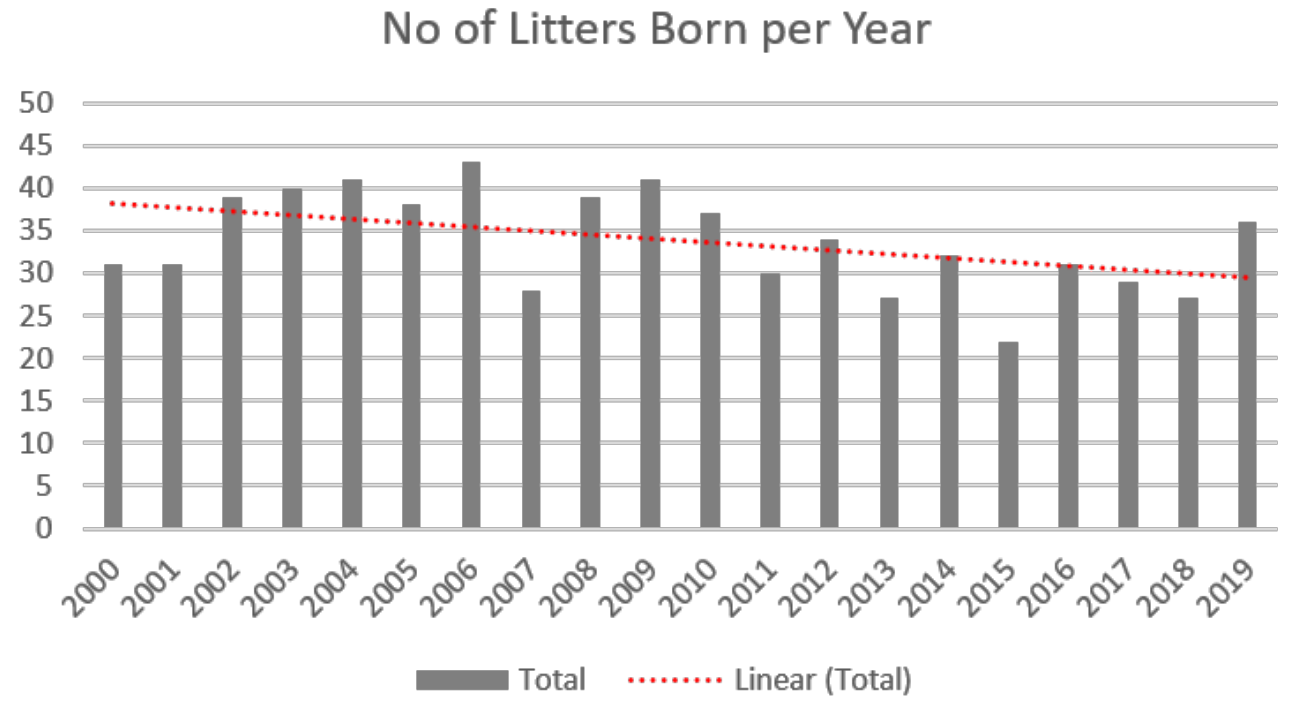
Graph 1

A further breakdown in the number of puppies born is shown in graph 2 below which demonstrates the number of black Giant Schnauzer puppies compared to Pepper & Salt. Both colours show a gradual downward trend, although the number of p/s puppy registrations has began to increase again over the last few years. Puppies recorded under 'CNR' prior to 2016 were actually registered as Black & Silver, and later as 'Colour Not Recognised' since the KC changed the way colours were registered.



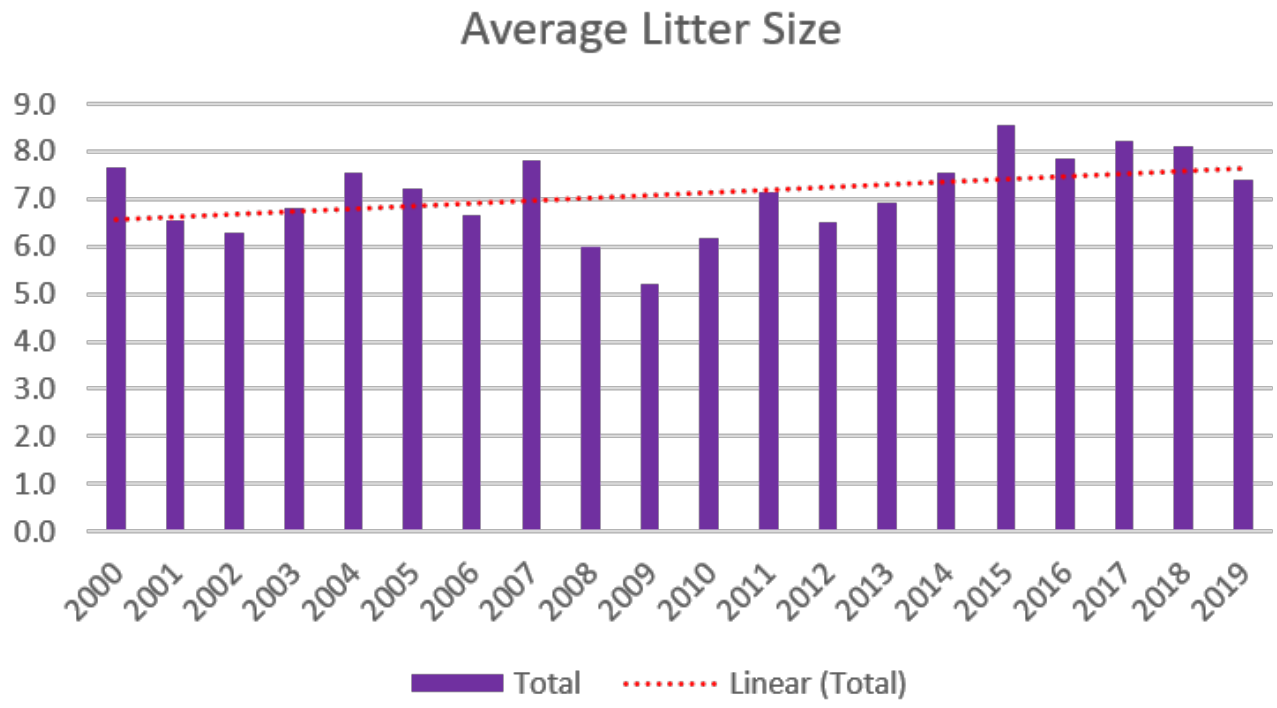
Graph 2

The number of litters born, and registered, per year also shows a downward trend on average by 24%, which is more than the 11% decrease in number of puppies born with the difference likely being due to a slight increase in average litter size recently.



Graph 3

The trend in average number of puppies per litter since 2000 is shown in graph 4 below, although there is a decrease associated with smaller litter sizes for a period of 5 years, between 2008 and 2012, the average litter size has increased overall in the last 19 year period by 16%



Graph 4

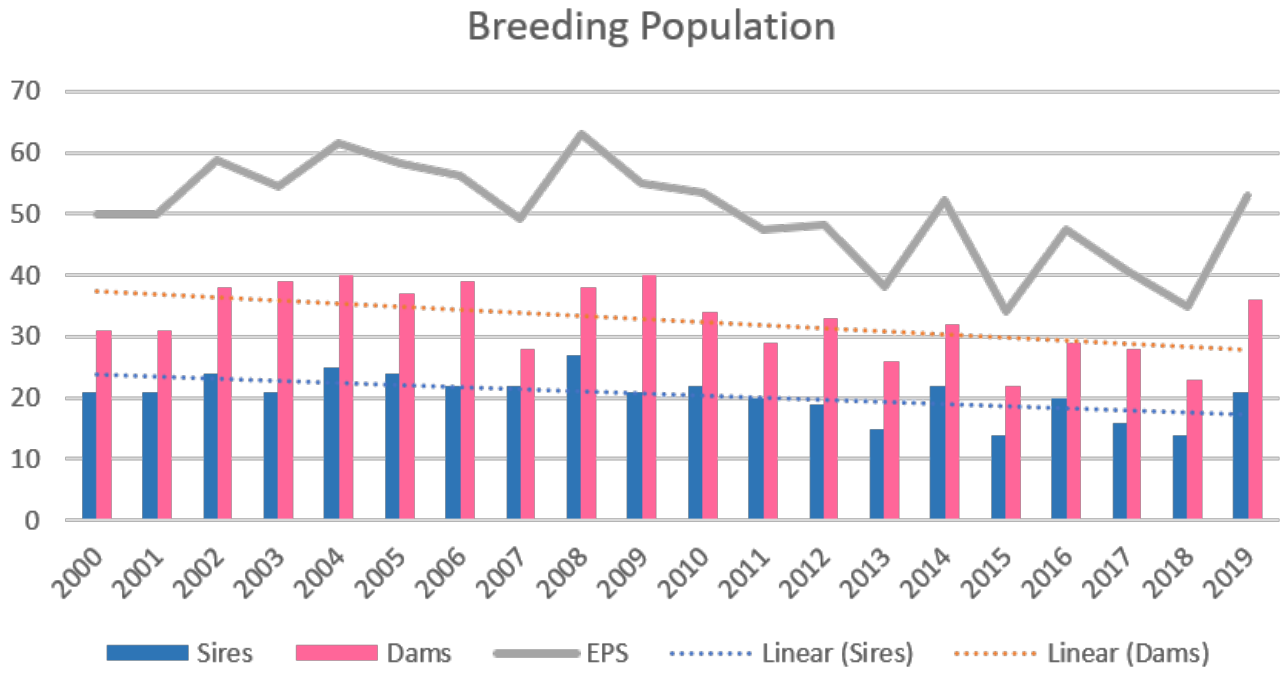
Breeding Population – Effective Population Size (EPS)

The Effective Population Size (EPS) is the number of individuals in a population that contribute offspring to the next generation, and can be calculated from the number of breeding males and females per year using the following formula:

$N_e = (4 \text{ x } N_m \text{ x } N_f) / (N_m + N_f)$

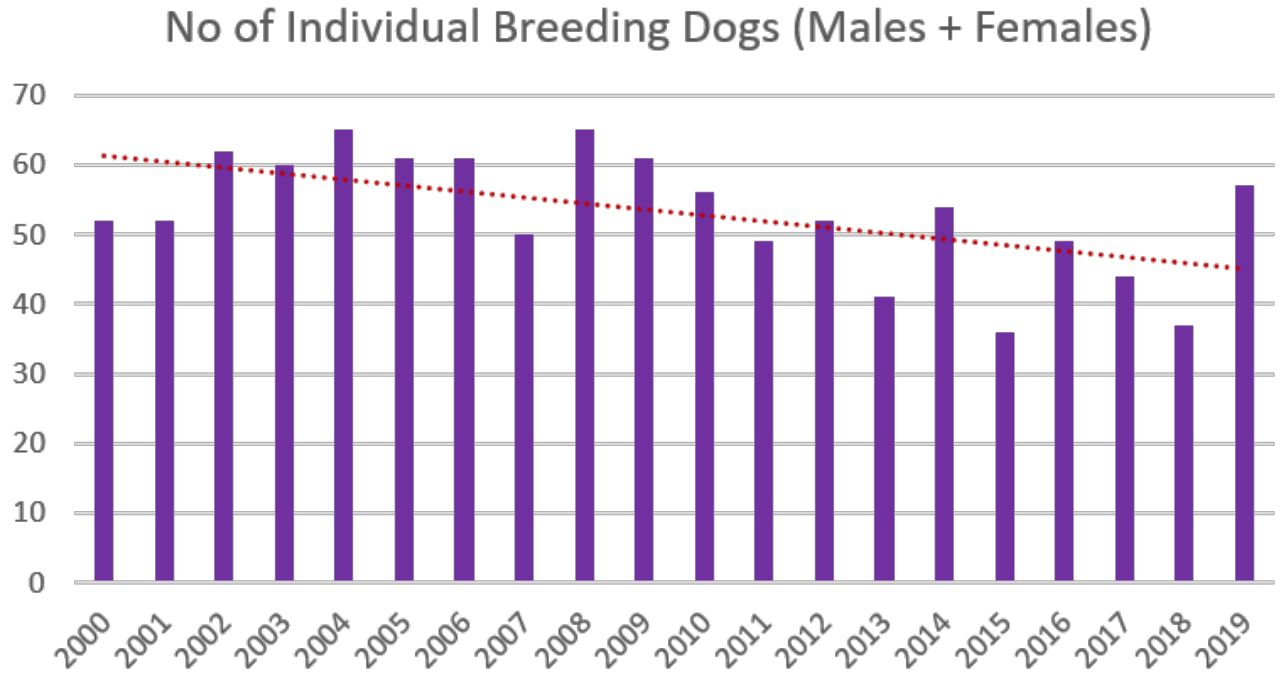
where N_m is the number of males and N_f the number of females used for breeding per year.

The breeding population graph 5 shows a 29% reduction in the effective breeding population size of the Giant Schnauzer over the past 19 years. A so-called '50/500' rule states that to avoid inbreeding depression (i.e. loss of 'fitness' due to genetic problems), an effective population size (N_e) of at least 50 individuals in a population is required. According to Bradshaw [2] 50 is too low to ensure no inbreeding depression for the majority of species that have been investigated. In fact, $N_e \geq 100$ is closer to the real minimum. The Kennel Club [3] state that moving forward we need to look at ways to manage the genetic diversity in the dog population to try and prevent breeds from becoming genetically homogenous (i.e. two copies of the same gene). One way of achieving this is to ensure there is a greater number of individual dogs contributing to the genetic population, in addition to avoiding the use of popular sires and maintaining a low inbreeding coefficient.



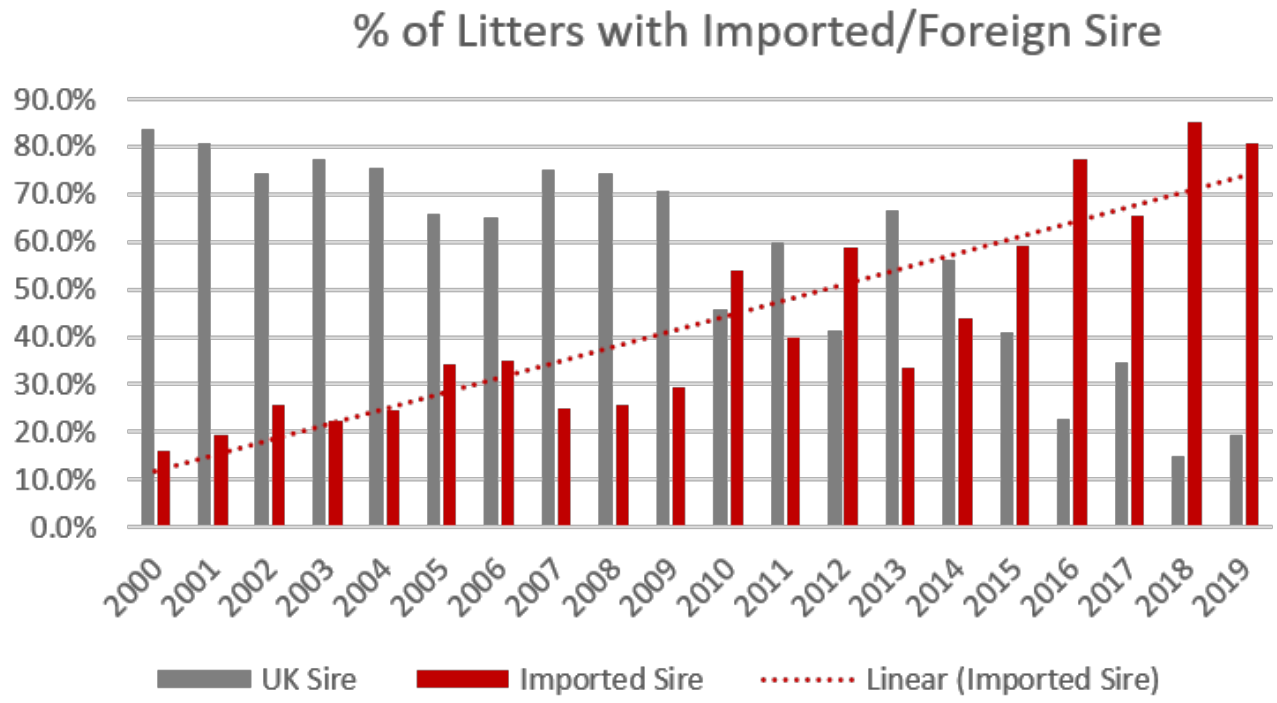
Graph 5

Graph 5b below shows the number of individual breeding dogs, males and females, used for breeding each year. This represents the decline in numbers of individual breeding dogs to below the minimum level of 50 required to prevent the inbreeding depression already mentioned. However 2019 shows an increase in the number of dogs used for breeding which is promising and better for the breed in general if this can be maintained in the future.



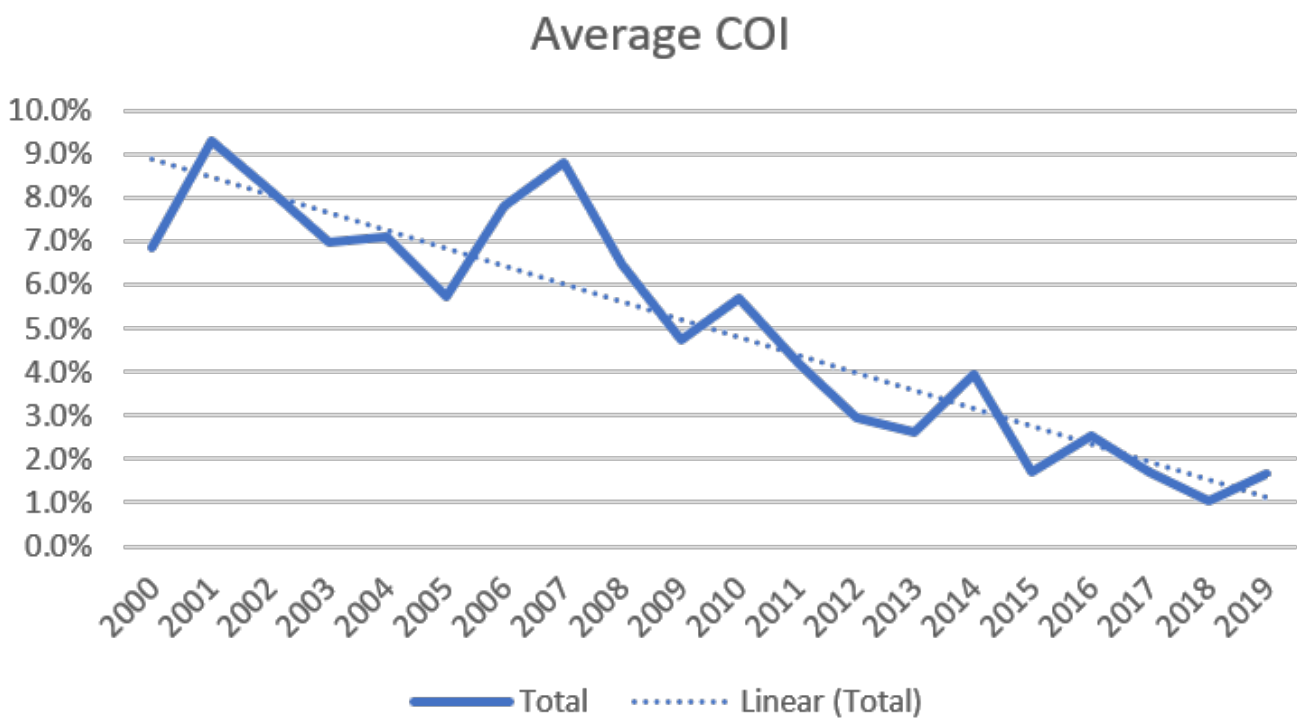
Graph 5b

Graph 6 below shows an increase in the use of imported or foreign sires; over this time period the UK import rules changed making it easier to import dogs under the pet passport scheme. Although the use of imported sires has increased significantly there has been no significant corresponding increase in the effective population size, and the EPS has continued to decrease on average, which may indicate that individual imported sires are used on a frequent basis and produce a greater number of litters (the so-called Popular Sire effect).



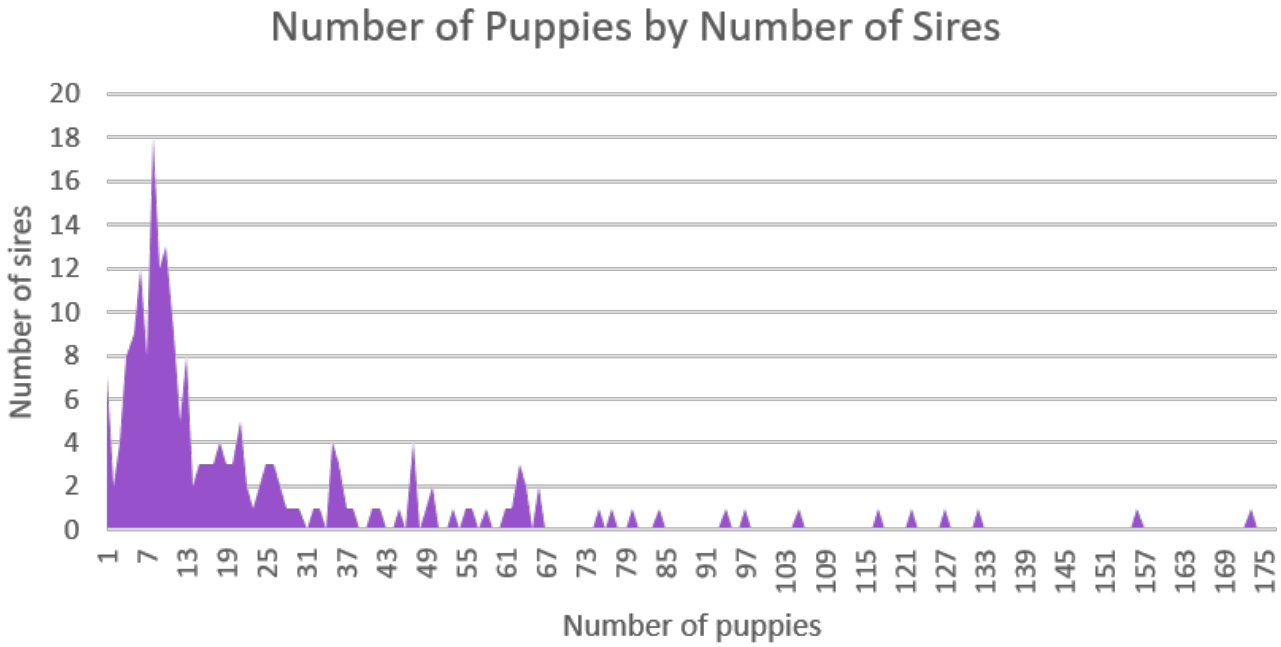
Graph 6

Graph 7 below shows the average inbreeding coefficient per year for puppies born and registered in the UK using the Kennel Club's Mate Select system, which demonstrates a significant downward trend. This may be related to the increased use of imported or foreign sires over the same period. It is worth noting that the Kennel Club Mate Select system currently only uses 3 generations to calculate the COI of imported dogs, and therefore may underestimate the actual inbreeding coefficient. In January 2012 the UK Kennel Club also prevented the registration of offspring from any mating between father and daughter, mother and son or brother and sister. The current Kennel Club breeding guidelines state that, where possible, breeders should produce puppies with an inbreeding coefficient which is at, or below, the annual breed average and ideally as low as possible.



Popular Sires

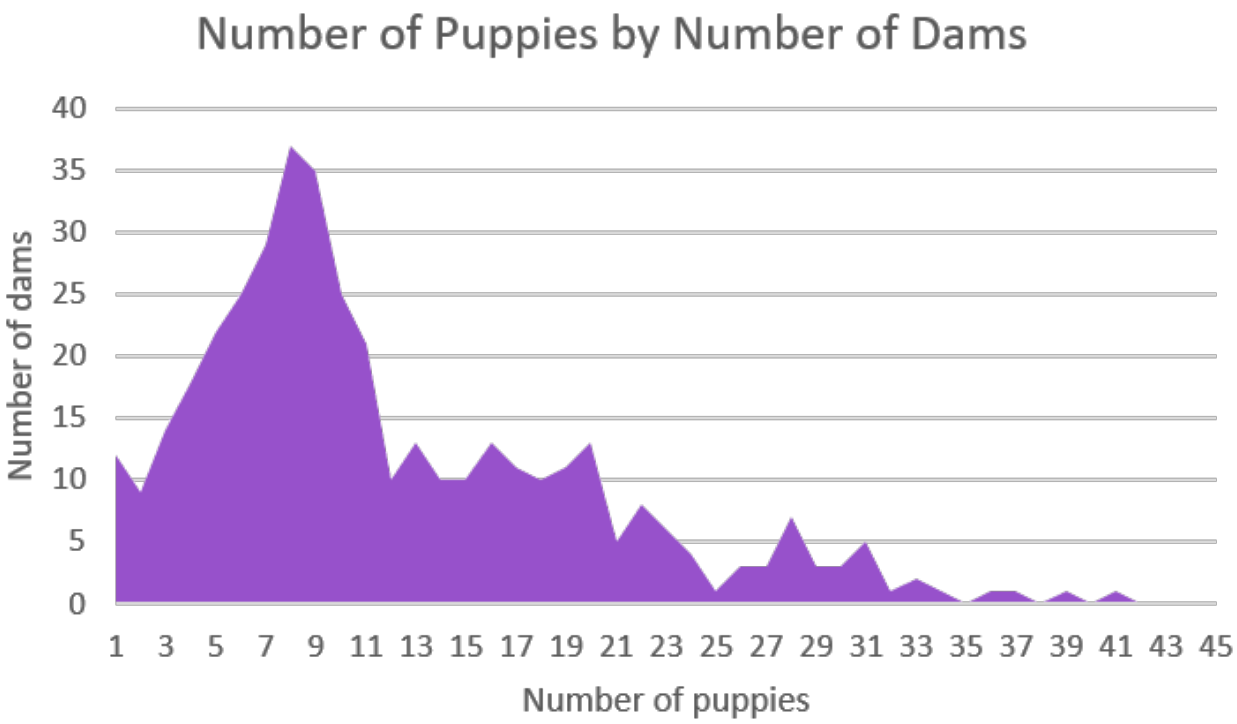
Graph 8 below shows evidence for popular sire effects, based on puppies born since the year 2000, the majority of sires produced less than 30 puppies, 26 sires produced between 30 and 60 puppies, with 13 sires producing between 60 and 90 puppies. The graph also demonstrates that 8 sires produced over 90 puppies, and 1 sire produced over 170 puppies, with 6 of the main producers being imported dogs.



According to Farrell et al [4] widespread use of a popular male to sire many litters leads to over representation of that dog's genome in the breed. As a consequence, the genetic diversity within a population is reduced, leading to a smaller effective population size.

Number of Puppies Per Dam

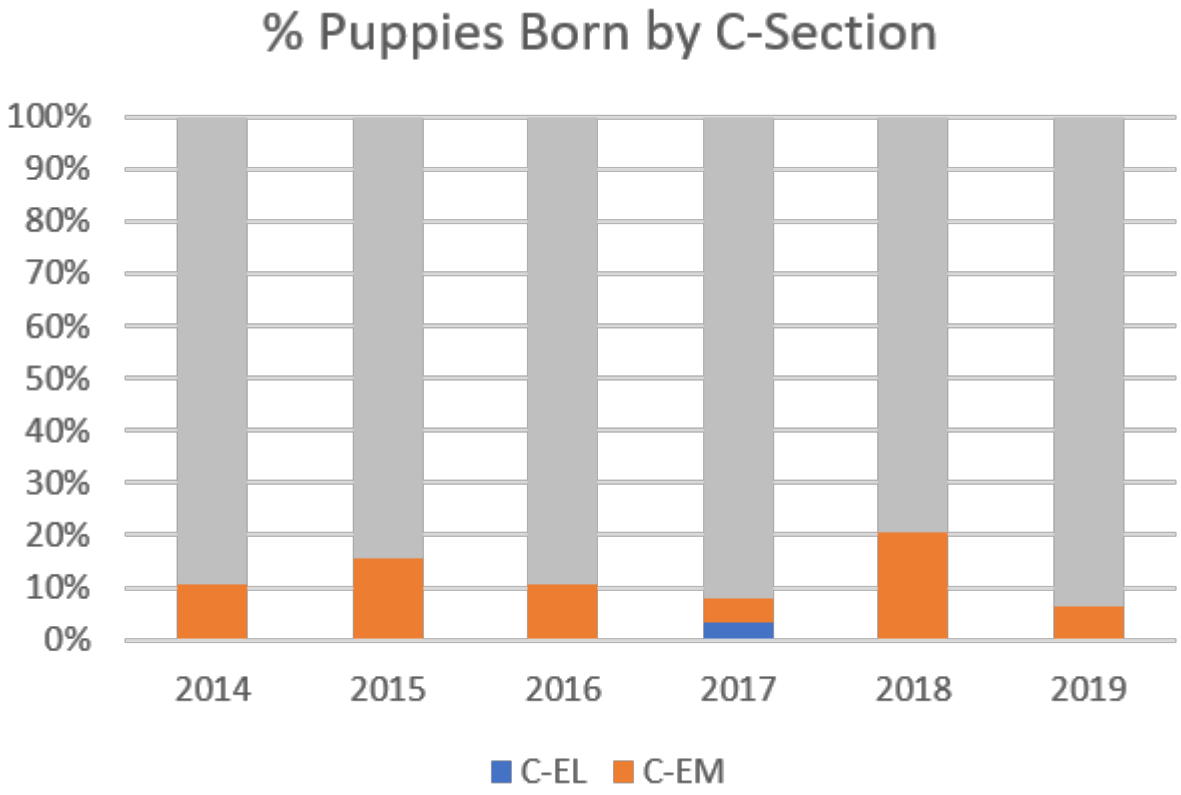
The number of puppies per dam is shown in the graph below. The majority of females produced 1-2 litters having less than 30 puppies in total each. 60 females produced 3 litters ranging from 11-34 puppies, and 16 females produced 4 litters ranging from 13-41 puppies per dam.

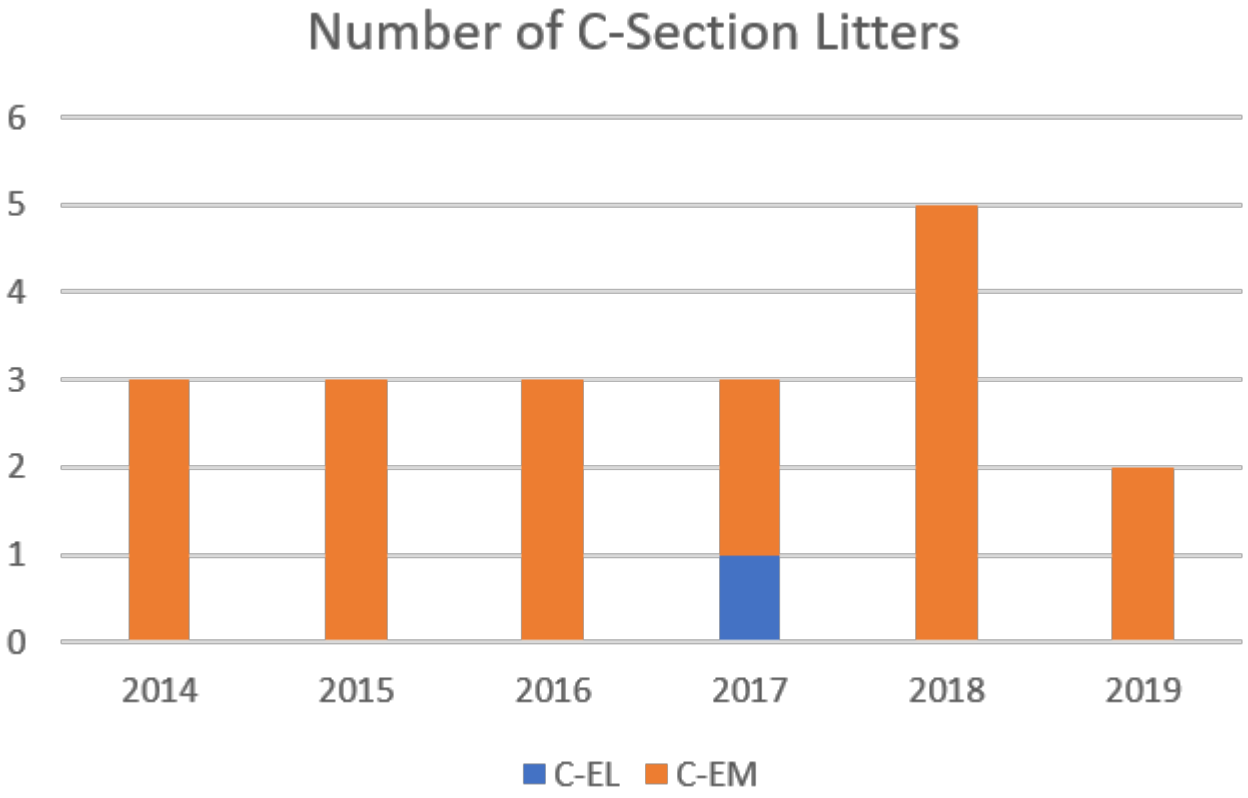


Graph 9

Litters Born By Caesarean

In 2014 the Kennel Club began identifying litters born by caesarean section via the breed record supplement to facilitate monitoring and emergence of any health/welfare issues associated with whelping. Caesareans are recorded as either emergency (C-EM) or elective (C-EL). This followed the KC's announcement in 2012 that no more than two litters born by caesarean section, in addition to no more than four litters in total, may be registered with the Kennel Club from the same bitch. Since then 2-5 litters (6-21%) per year were reported as requiring caesarean section. Of the litters born via caesarean during this period, the number of registered puppies from each c-section litter varied between 7-13 puppies, apart from 1 litter registering 4 puppies. Without more research it is currently not possible to determine any particular health reasons requiring caesarean section, however there is potentially an association with large litter sizes.


% Puppies Born by C-Section
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2014
2015
2016
2017
2018
2019
C-EL
C-EM


Number of C-Section Litters
6
5
4
3
2
1
0
2014
2015
2016
2017
2018
2019
C-EL
C-EM

Summary

- UK Giant Schnauzer annual puppy registrations have reduced on average by 11% over the last 19 years
- Average litter size has slightly increased, possibly in correlation to less inbreeding
- Breed average Coefficient of Inbreeding has reduced from around 8% in 2000 to 1.7% in 2019 and this may be related to an increase in the use of imported sires
- The breed's Effective Population Size has decreased by around 29% over the last 19 years with an average decline in both the number of males and females used for breeding
- There is evidence of 'popular sire effect' which will impact on the breed's overall genetic diversity
- The number of litters born via caesarean section is, on average, 11% and there may possibly be an association with large litter sizes, although more research is required.

Recommendation

Based on the data since 2000 and considering the effective population size is decreasing it may be useful for breed clubs and breeders to come together and develop a strategy for the future of the Giant Schnauzer, such as the general breeding strategies developed by the Federation Cynologique Internationale (FCI) [5] and Finnish Kennel Club [6].

Breeders may consider using a wider variety of dogs, both males and females, in their breeding program to increase the effective breeding population and maintain genetic diversity. In 2018 the Giant Schnauzer Health Fund, and 3 UK breed clubs representing Giant Schnauzers supported the UC Davis research into genetic diversity within the breed. A DNA test can now be used to assess the level of 'genetic' inbreeding for each individual dog, and this new technology may be used to plan matings that will facilitate conservation of the breed into the future. Up-to-date information on the UC Davis genetic diversity research can be found on their website: UC Davis Giant Schnauzer Genetic Diversity

Summary of data formulated from the KC BRS and KC Mate Select

Birth Year	Litters	Pups	Avg Litter Size	Colour			Gender		Avg COI	C-Sections	Litters by Imported Sire	% Litters by Imported Sire	No of Sires	No of Dams	EPS
				Black	P/S	CNR	Males	Females							
2000	31	238	7.7	221	17		128	110	6.9%		5	16%	21	31	50
2001	31	203	6.5	173	29	1	111	92	9.3%		6	19%	21	31	50
2002	39	245	6.3	200	45		117	128	8.2%		10	26%	24	38	59
2003	40	273	6.8	224	47	2	133	140	7.0%		9	23%	21	39	55
2004	41	310	7.6	246	60	4	151	159	7.1%		10	24%	25	40	62
2005	38	274	7.2	226	46	2	132	142	5.7%		13	34%	24	37	58
2006	43	286	6.7	268	18		149	137	7.8%		15	35%	22	39	56
2007	28	219	7.8	188	31		108	111	8.8%		7	25%	22	28	49
2008	39	234	6.0	207	24	3	124	110	6.5%		10	26%	27	38	63
2009	41	214	5.2	201	13		113	101	4.8%		12	29%	21	40	55
2010	37	228	6.2	215	11	2	117	111	5.7%		20	54%	22	34	53
2011	30	214	7.1	193	21		121	93	4.2%		12	40%	20	29	47
2012	34	221	6.5	209	12		107	114	2.9%		20	59%	19	33	48
2013	27	187	6.9	163	24		91	96	2.6%		9	33%	15	26	38
2014	32	242	7.6	218	24		118	124	3.9%	3	14	44%	22	32	52
2015	22	188	8.5	177	11		112	76	1.7%	3	13	59%	14	22	34
2016	31	243	7.8	209	32	2	134	109	2.5%	3	24	77%	20	29	47
2017	29	238	8.2	203	35		127	111	1.7%	3	19	66%	16	28	41
2018	27	219	8.1	193	26		117	102	1.0%	5	23	85%	16	27	40
2019	36	266	7.4	209	57		148	118	1.7%	2	29	81%	21	36	53

Lesley Parker May 2015 (Updated 2017, 2019 & 2020)

Giant Schnauzer Breed Health Co-ordinator

References

1. Kennel Club Breed Record Supplement, Working Group 2000 – 2018
2. Bradshaw, CJA 2014. We're sorry, but 50/500 is still too few. *ConservationBytes* [online]. Available at: http://conservationbytes.com/2014/01/28/were-sorry-but-50500-is-still-too-few/ [Accessed 8/5/015]
3. Kennel Club. Genetic Diversity. *Mate Select* [online]. Available at: http://www.thekennelclub.org.uk/services/public/mateselect/genetic-diversity.aspx [Accessed 8/5/015]
4. Farrell, Lynsday L. Schoenebeck, Jeffrey J. Wiener, Pamela. Clements, Dylan N & Summers , Kim M. The challenges of pedigree dog health: approaches to combating inherited disease. *Canine Genetics and Epidemiology* [online]. Available at: http://www.cgejournal.org/content/2/1/3 [Accessed 8/5/015]
5. Federation Cynologique Internationale (FCI) (AISBL) 2010. FCI International Breeding Strategies. *Federation Cynologique Internationale For Dogs Worldwide* [online]. Available at: http://www.fci.be/medias/ELE-REG-STR-en-451.pdf [Accessed 20/5/015]
6. The Finnish Kennel Club. General Breeding Strategy. Kennellitto – *Responsible Breeding* [online]. Available at: http://www.kennelliitto.fi/sites/default/files/media/breeding_strategy_0.pdf [Accessed 20/5/015]