

## Sustainable hunting plan as a tool of wildlife management: the Italian case

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### Abstract

Sustainable hunting plan is an interesting tool for managing game species in order to avoid potential conflicts with other ecosystem services (biodiversity conservation, recreation and the preservation of economies and cultures in rural areas). If wildlife population increases too much, natural ecosystems functionality can be threatened by ungulates' browsing and grubbing. Conversely, when species conservation is at risk, the hunting itself needs to be limited. Sustainable hunting plans can managed emerging conflicts. The aim of this study is to analyze hunting in Italy - through the provision of up-to-date statistics - in order to inform local planners and managers for the developing of local sustainable hunting plans. The results show that the main hunted large mammals species are wild boar in Central Italy and red deer and roe deer in North Italy, while the main hunted small mammals are wild rabbit and European hare.

### Keywords

wild game species, hunting statistics, ecosystem service, Italy.

### Introduction

Sustainable hunting is defined as the use of wild game species in a way and at a rate that does not lead to the long-term decline of biodiversity or hinder its restoration (BRAINERD 2007). In accordance with the definition of 'sustainable use' by art.2 of the Convention on Biological Diversity (CBD), sustainable hunting has the goal to maintain biodiversity to meet the needs and aspirations of present and future generations, as well as maintaining hunting itself as an accepted social, economic and cultural activity. In other words, hunting can positively contribute to the regulation of game populations and their habitats, so that also society can benefit (MILNER-GULLAND et al. 2009). From the theoretical point of view, sustainable hunting removes the number of individuals added to the population through natural population growth (logistic equation). In addition, hunting affects the distribution of population by age, sex and stage classes (CALVETE et al. 2005), and the structure and function of the community as whole (e.g. ecosystem services provisioning such as biodiversity conservation, recreation and the preservation of economies and cultures in rural areas) (FISCHER et al. 2013). The key tool to regulate hunting in a sustainable way is the 'sustainable hunting plan'. The objective of the sustainable hunting plan is to establish the annual number of individuals to be hunted by species based on the wildlife censuses and natural population growth. Therefore, in order to develop sustainable hunting plans at national and local level a key point is to have constantly updated hunting statistics.

Starting from these preliminary considerations, the aim of this contribution is to provide the hunting statistics at national level in Italy. The need to provide national hunting statistics is particularly felt in Italy because the 21 Regions and Autonomous Provinces have total freedom in the hunting data recording system.

### Game hunting management in Italy

In Italy, game hunting management is arranged in four administrative levels: national, regional, provincial and a sub-provincial level. At the national level, the State establishes that protection of wildlife species is the rule and game hunting is the exception (art.2 National Law n.157/1992). For that reason, the National Law n.157/1992 makes a detailed list of which species can be hunted distinguishing between sedentary and migratory species, the time when they can be hunted and how they can be hunted (art.18). In addition, the National Law establishes that the whole rural area (agricultural lands, forests and grasslands) must be managed through a management plan aimed at organizing game hunting on the basis of the number and the reproductive capacity of the species in the area (art.10). This National Law also states that it is responsibility of the Regions (21 Regions and Autonomous Provinces) and Provinces (110 Provinces) to formulate the game hunting management plan. Each Region and Province has to draw up a Regional Game Hunting Plan ('Piano Faunistico Venatorio Regionale' - RGHP) and a Provincial Game Hunting Plan ('Piano Faunistico Venatorio Provinciale' - PGHP).

The RGHP is a large-scale plan that establishes the criteria to determine the optimal land use and the criteria needed to set up private game hunting organization (called 'Aziende Faunistico Venatorie'-AFV and 'Aziende Agro-Turistico-Venatorio' AATV). In addition, the Regions promulgate regional laws and regulations to integrate the National Law and to adapt the game hunting activities to local peculiarities. In particular, the National Law established that 20%-30% of regional rural area must be assigned to the protection of wildlife species (this

percentage is reduced to 10-20% in Alpine area), a maximum of 15% can be reserved to private game hunting (AFV and AATV); and the remaining part of rural area must be managed through a game hunting management plan.

The PGHP identifies which part of the provincial rural area has to be assigned to different uses, in accordance with the principles laid down by National Law n.157/1991, Regional laws and regulations. Each Province identifies the optimal land use destination and the institutions for managing the game hunting activities at local level (sub-provincial level). In Italy, four institutions (two public institutions and two private institutions) are responsible for managing wildlife at local level: 'Ambiti Territoriali di Caccia' (ATC), 'Comprensori Alpini' (CA), 'Aziende Faunistico Venatorie' (AFV) and 'Aziende Agro-Turistico Venatorie' (AATV).

ATC and CA are public institutions responsible for game hunting at local level. These institutions are also responsible for the census of wildlife and for assigning the number of animals to be killed for each hunter. Hunters have to be registered at least in one ATC or CA, and they can hunt only in that ATC or CA. They can be registered in more than one ATC or CA or they cannot, depending on ATC or CA statute. ATC and CA may have a maximum number of registered hunters established by the Region on the basis of their rural area. ATC and CA have the same competences and powers but with a substantial difference: CA can only exist in the Alpine area, while ATC in the rest of the country.

AFV and AATV are game hunting private organizations, but with some differences.: (1) AATV are profit organizations while AFV are not; (2) in the AFV hunters pay a membership fee, while in the AATV hunters are not members but pay a ticket for hunting; (3) AFV are required by law to have a plan for wildlife protection and to respect the game hunting calendar, while AATV are not bound to have a wildlife protection plan and to follow the calendar.

Specifically, the game hunting calendar is a period of the year when game hunting is allowed. The National Law defines the starts and ends of the calendar for each species, but the Regions are allowed to modify this period. The game hunting calendar is reported in the hunting card ('tesserino venatorio'), that is a one year effective document in which hunters report all hunted animals. At the end of the game hunting season, hunters have to return the game hunting card to the institution provided by the regional laws (e.g., ATC, CA). Consequently, the information on the number of animals hunted by specie are collected at local level from several different institutions: ATC, CA, AFV and AATV. These local institutions should send the data to the highest administrative level (Province or Region). However, according to the National Law the local institutions are not forced to register the number of hunted animals and all other information included in the hunting cards.

Taking into account these considerations, in order to collect the data concerning the number of hunted animals it was necessary to request the information at all administrative levels (Fig.1): local level (ATC, CA, AFV and AATV), provincial level and regional level.

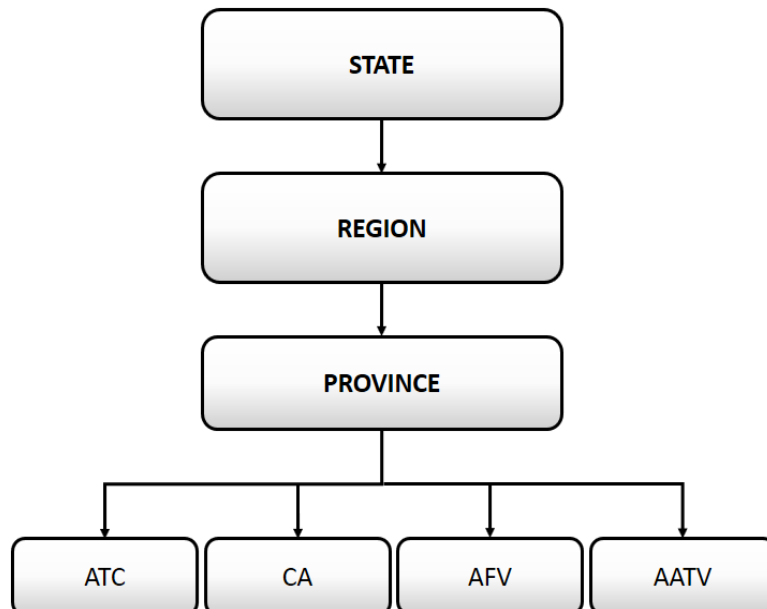


Figure 1: Framework concerning the public and private institutions involved in the game hunting management in Italy.

## Materials and methods

The research framework aimed to investigate the number of animals hunted in Italy and the resulting economic fallout has been divided into the following three steps:

1. identification of total number of institutions involved in the game hunting management and total rural area managed;
2. development and administration of a semi-structured questionnaire aimed to collect the basic information about game hunting at local level;
3. statistical elaboration of the collected data in order to produce national statistics on game hunting.

The questionnaire was divided in six thematic sections. The first thematic section focuses on the personal information of respondent (name, role in the institution), the second one is about institution information (rural area divided in protect area and game hunting area). The third and the fourth thematic sections focus on the numbers of hunted animals by species and the number of hunters that are member of the institution, on a three years base (2013-2016). The last two thematic sections focuses on the cost-benefit analysis of game hunting (values of trophy and meat). The first version of the questionnaire - designed for the local institutions (ATC, CA, AFV and AATV) - was adapted to the peculiarities of Provinces and Regions.

The preliminary version of questionnaire was pre-tested with two ATC and one Region in order to check for any problems and difficulties in filling it.

Region/Specie	Chamois	Roe deer	Red deer	Fallow deer	Moufflon	Wild boar	Total
Valle d'Aosta	857	1072	285	0	0	409	<b>2623</b>
Piemonte	1996	4101	1470	159	139	n.a.	<b>7865</b>
Liguria	39	1053	0	305	0	13856	<b>15253</b>
Lombardia[1]	604	528	1210	7	138	2155	<b>4642</b>
Trento	2820	4195	1818	0	227	0	<b>9060</b>
Bolzano	3558	8916	3115	0	3	3	<b>15595</b>
Veneto[2]	1213	2079	1811	150	650	n.a.	<b>5903</b>
Friuli Venezia-Giulia	629	4018	1201	3	131	2281	<b>8263</b>
Emilia-Romagna	0	16551	1086	1216	0	22270	<b>41123</b>
Toscana	0	18197	679	1500	330	74146	<b>94852</b>
Umbria	0	783	0	157	0	2345	<b>3285</b>
Marche	0	2287	0	62	0	7395	<b>9744</b>
Abruzzo	0	0	0	0	0	3443	<b>3443</b>
Molise	0	n.a.	n.a.	n.a.	n.a.	n.a.	<b>n.a.</b>
Lazio	0	66	0	6	0	3802	<b>3874</b>
Campania	0	0	0	0	0	1129	<b>1129</b>
Basilicata	0	n.a.	n.a.	n.a.	n.a.	n.a.	<b>n.a.</b>
Puglia	0	n.a.	n.a.	n.a.	n.a.	n.a.	<b>n.a.</b>
Calabria	0	n.a.	n.a.	n.a.	n.a.	n.a.	<b>n.a.</b>
Sicilia	0	0	0	0	0	719	<b>719</b>
Sardegna	0	0	0	0	0	10582	<b>10582</b>
<b>Italy</b>	<b>11716</b>	<b>63846</b>	<b>12675</b>	<b>3565</b>	<b>1618</b>	<b>144535</b>	<b>237955</b>

Table 1: Large mammals species hunted per year by species and Region (2013-2016 average).[1] The number refers to the provinces of Brescia, Como and Sondrio. [2] The number refers to the provinces of Belluno and Vicenza.

Region/Specie	Eurasian Skylark	Teal	Woodcock	Snipe	Fieldfare	Wood pigeon	Hooded crow	Carrion crow	Rock partridge	Pheasant	Black grouse	Moorhen	Magpie	Mallard	Jay	Blackbird	Rock ptarmigan	Red-Legged partridge	Barbary partridge	Quail	Grey Partridge	Song thrush	Redwing	Turtledove	Total	
Valle d'Aosta	0	0	22	0	0	12	3	0	0	0	0	0	0	0	0	327	0	0	0	0	0	78	0	0	442	
Piemonte	3482	346	7816	3044	3228	4756	2478	501	229	28058	441	503	509	10640	739	0	0	184	0	1539	399	4294	2063	451	75700	
Liguria	3	29	4511	116	729	15273	324	96	0	6309	52	35	1666	258	8600	41715	872	0	0	156	695	87817	9704	980	179940	
Lombardia	146732	7780	28941	17135	134902	45671	7054	371	226	140365	593	9901	2395	42295	6045	313956	250	2926	0	6446	14217	1085626	154759	2803	2181319	
Trento	399	2	4489	26	15438	260	52	72	0	3679	0	0	0	790	4297	39331	0	0	0	2	0	36165	6133	20	111065	
Bolzano	0	10	244	0	4622	183	0	532	49	6	343	0	215	818	1651	3823	232	0	0	0	0	466	0	0	13204	
Venezia[1]	66190	1288	6316	4887	16514	10548	321	20	2	35441	55	670	1036	12969	1516	70365	4	0	0	16467	8092	274801	30444	1093	559129	
Friuli Venezia-Giulia	20299	2604	8234	1259	9887	6584	1403	92	0	54851	82	985	485	9579	2389	23729	124	99	0	7608	2038	31302	9237	138	193408	
Emilia-Romagna	22658	21870	9545	3361	14267	29229	3489	0	0	97390	0	1500	2130	38870	4760	48213	0	3310	0	1712	1510	52602	15778	10575	383789	
Toscana	50181	n.a.	11309	n.a.	n.a.	98157	863	n.a.	n.a.	74394	0	n.a.	n.a.	5363	n.a.	159957	0	n.a.	0	3572	n.a.	355886	n.a.	n.a.	739682	
Umbria	33476	679	3039	725	0	34808	1372	0	0	7928	0	0	0	955	2171	38648	0	362	0	4583	718	117405	12473	6487	265829	
Marche	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Abruzzo	4775	190	3632	287	418	26568	511	0	40	4096	0	22	243	302	487	5465	0	0	0	2906	404	25876	1066	3944	81522	
Molise	n.a.	1	769	23	2	596	n.a.	n.a.	n.a.	250	0	n.a.	n.a.	n.a.	n.a.	58	n.a.	n.a.	0	n.a.	n.a.	387	74	n.a.	2560	
Lazio	34617	2723	12930	3227	1448	20525	11578	0	0	14368	0	1224	2149	2110	2721	29653	0	0	0	4925	213	138920	13253	6428	309017	
Campania	23284	1107	8385	2280	645	9410	1428	41	1	800	0	250	1869	446	1689	5950	0	2	0	9971	615	99597	7288	7483	142511	
Basilicata	7094	114	4387	352	977	7610	508	0	0	618	0	35	569	445	948	2574	0	0	0	2683	0	19780	888	2627	52214	
Puglia	27176	n.a.	4239	n.a.	607	1420	n.a.	n.a.	n.a.	133	0	n.a.	n.a.	n.a.	n.a.	24797	n.a.	n.a.	0	6339	11	n.a.	n.a.	1638	66344	
Calabria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	n.a.	n.a.	n.a.	n.a.	n.a.	
Sicilia	14155	8198	8198	1823	558	46398	0	0	0	31	0	671	1147	624	424	6865	0	0	0	4834	3	44918	1895	7518	147860	
Sardegna	5808	531	1955	1955	223	62160	2223	0	0	0	0	433	0	3327	2416	6829	0	0	5962	6710	0	135788	20761	10829	267910	
Italy	460269	47472	128925	40600	204485	421158	33607	1725	547	468697	1566	16229	14353	130791	40853	832255	1482	6883	5962	80058	28915	2451708	285821	62984	5767445	

Table 2: Birds hunted per year by species and Region (2013-2016 average). [1] The number refers to the provinces of Belluno and Vicenza.

## Results

The response rates (in surface) distinguishing between groups of hunted species are the following: 92.3% of rural area (87.0% of hunting rural area) for birds species, 80.1% of rural area (75.8% of hunting rural area) for large mammals species, and 62.7% of rural area (57.8% of hunting rural area) for small mammals species.

In the period 2013-2016 (three years), the main two large mammals species hunted are (Tab. 1): wild boar with 60.7% of ungulates hunted (144,535 animals per year) and roe deer with 26.8% of ungulates hunted (63,846). The main three birds species hunted are (Tab. 2): song thrush with 42.5% of total birds species hunted (2,451,708), blackbird with 14.4% of total birds species hunted (832,255), and pheasant with 8.1% of total birds species hunted (468,697). Among the small mammals species the most hunted species are (Tab.3): wild rabbit (144,941) and European hare (105,595).

Observing the data by region, the Lombardia is the Italian region where most bird species are hunted with more than 2 million of individuals (around 50% are song thrush). Conversely, in the Toscana the largest number of large mammals species is hunted (about 95,000 individuals per year, corresponding 40% of total large mammals species hunted) and in Sicilia the largest number of small mammals species is hunted (around 137,000 individuals, corresponding 53% of total small mammals species).

Region/Specie	Red fox	Wild rabbit	European hare	White hare	Sardinian hare	Total
Valle d'Aosta	23	0	211	22	0	<b>256</b>
Piemonte	n.a.	n.a.	n.a.	n.a.	0	<b>n.a.</b>
Liguria	n.a.	n.a.	n.a.	n.a.	0	<b>n.a.</b>
Lombardia[1]	594	694	10442	123	0	<b>11853</b>
Trento	n.a.	n.a.	n.a.	n.a.	0	<b>n.a.</b>
Bolzano	1610	0	2756	373	0	<b>4739</b>
Veneto[2]	275	400	7706	53	0	<b>8434</b>
Friuli Venezia-Giulia	527	15	7128	0	0	<b>7670</b>
Emilia-Romagna	n.a.	n.a.	58423	0	0	<b>58423</b>
Toscana	0	2083	7899	0	0	<b>9982</b>
Umbria	203	159	5221	0	0	<b>5583</b>
Marche	n.a.	n.a.	n.a.	0	0	<b>n.a.</b>
Abruzzo	567	0	2939	0	0	<b>3506</b>
Molise	n.a.	n.a.	n.a.	0	0	<b>n.a.</b>
Lazio	714	0	2601	0	0	<b>3315</b>
Campania	189	16	269	0	0	<b>474</b>
Basilicata	n.a.	n.a.	n.a.	0	0	<b>n.a.</b>
Puglia	n.a.	n.a.	n.a.	0	0	<b>n.a.</b>
Calabria	n.a.	n.a.	n.a.	0	0	<b>n.a.</b>
Sicilia	1167	135963	0	0	0	<b>137130</b>
Sardegna	935	5611	0	0	2378	<b>8924</b>
<b>Italy</b>	<b>6804</b>	<b>144941</b>	<b>105595</b>	<b>571</b>	<b>2378</b>	<b>260289</b>

Table 3: Small mammals species hunted per year by species and Region (2013-2016 average). [1] The number refers to the provinces of Brescia, Como and Sondrio. [2] The number refers to the provinces of Belluno and Vicenza.

## Conclusion

The present study has collected and analyzed hunting statistics in Italy distinguishing between regions or provinces and wildlife game species. The results of this study can be considered as the starting point for the development of sustainable hunting plans at the provincial and regional level.

The future steps of the study will be to provide annually hunting statistics by defining a standardized data collection system and to integrate current knowledge gaps (regions with partial or unavailable hunting statistics). Annual hunting statistics can provide useful information to decision makers (planners and managers) for managing hunting activities in a sustainable way.

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