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Fire Flocks: Participating Farmers' Perceptions after Five Years of Development

Sergi Nuss-Girona [1], Emma Soy [2], Guillem Canaleta [2], Ona Alay [2], Rut Domènech [3] and Núria Prat-Guitart [2,*]

[1] Geography Department and Environment Institute, University of Girona, 17004 Girona, Spain
[2] Pau Costa Foundation, Av. Mossèn Cinto Verdaguer, 42 esc. A bxs 2a., 08552 Taradell, Spain
[3] Consorci de Polítiques Ambientals de les Terres de l'Ebre (COPATE), Plaça Lluís Companys, 43870 Amposta, Spain
* Correspondence: nprat@paucostafoundation.org

Abstract: Nowadays, extensive livestock farming faces substantial threats in the Mediterranean region, provoking a setback dynamic in the sector. In 2016, the Fire Flocks (FF) project was conceived and implemented as a regional strategy to revert this situation and revalue the sector in Catalonia, in the NE of the Iberian Peninsula. FF promotes forest management through extensive livestock farming, and more specifically silvopastoralism, to reduce vegetation load and wildfire risk. The initiative also works on fire risk awareness with the aim of promoting extensive livestock products through FF label and valorization strategies. Five years after its initial implementation, the project managers detected several weaknesses and potential improvements directly affecting the economic and environmental performance of the participating farms. It was therefore considered necessary to conduct targeted qualitative interviews with the farmers participating in the project in order to gather their opinions on the project's functioning and further steps. To this end, 17 farmers were interviewed with the aid of a qualitative questionnaire. The farmers stated that although FF is not providing them with any direct financial benefits, it does present an opportunity to belong to a group of farmers working on wildfire prevention, thereby lending them a voice as a group, and reaching more social visibility. The qualitative analyses elucidate key elements to be promoted in FF, such as redesign of the operational structure, expansion to a regional scale and action lines to facilitate grazing activity.

Keywords: extensive livestock farming; forest management; silvopastoralism; wildfire risk reduction

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1. Introduction

1.1. Background and Aims of Investigation

Throughout most of the region of Catalonia (NE Spain), the landscape has undergone dramatic change in the last 70 years due to rural abandonment and the loss of economic activity, similar to other areas in the Mediterranean basin over the last century [1]. The reduction in traditional land uses, mainly agriculture, extensive livestock farming, and multipurpose forestry (e.g., timber, wood fuel, charcoal, resins), has allowed for the regeneration of secondary vegetation, characterized by the proliferation of shrubby and bushy species. At the same time, the landscape has also suffered a process of homogenization, with thousands of continuous hectares of highly fire-prone forests.

In this region, unmanaged forests are increasingly vulnerable to wildfires due to climate change. A small number of wildfires are responsible for most of the burnt area (just 11 fires were accountable for 88% of the surface burnt by 4800 fires over the last eight years) [2]. These large forest fires represent a growing risk to society, as firefighting services are unable to control them, despite the high budgets and investments allocated.

Fuel reduction treatments such as thinning, prescribed burning, or grazing can be used as tools to reduce fire risk and severity [3]. Fuel treatments modify species composition, structure, availability, distribution, fuel moisture, and surface-wind behavior [4]. The aim

of these treatments is generally to reduce the quantity of combustible biomass growing in the landscapes (fuel load) so that, if a wildfire does take place, it will spread more slowly and with less intensity, and will be less severe and easier to control [5]. To achieve this aim, while ensuring that forests are resilient against wildfires, fuel treatments should consider one or more of the following four basic principles [6]: reduce surface fuel, increase the height to the live crown, decrease crown density, and keep large trees of resistant species.

However, the effectiveness of a fuel treatment process depends on where it is applied in the landscape. Planning allows the establishment of 'firesmart' landscapes, with forest structures and spatial distribution patterns that contribute to hindering the spread of crown fires and facilitating the suppression of forest fires [7]. In relation to this, Strategic Management Areas (SMAs) are pieces of land with low fuel load or auxiliary lines, anchored to paths that allow the extinguishing system to concentrate resources more safely and efficiently [8] in order to limit fire propagation and affect its behavior (i.e., flame length and rate of spread). Complementary Areas (CAs) also have the purpose of fire prevention but are not used to carry out firefighting operations and only serve to weaken fire behavior. In Catalonia, SMAs and CAs are mainly identified within the boundaries of Priority Areas for Fire Prevention, large landscape units where the Catalan Department of Climate Action, Food and Rural Affairs (DCAFRA) has identified a need to promote wildfire risk reduction actions due to high risk.

Wildfire risk reduction is an increasing concern for public administrations in southern Europe [9], and wildfire prevention actions, often considered an ecosystem service, are becoming more common. Public administrations are realizing that wildfire suppression is no longer sustainable and that the solution goes beyond suppression and relies on putting the focus on landscape management [10]. Several initiatives are being implemented in Europe, many of them in Mediterranean countries. Despite these initiatives having different economic activities and approaches, all serve the common objectives of wildfire risk reduction [11]. For centuries, extensive livestock farming was an important tool for managing the landscape and reducing the potential for fires getting larger. However, the loss of extensive grazing in Mediterranean regions over the last 60 years has led to fuel loading and a higher risk of large and extreme wildfires [12]. The main drivers behind the reduction in extensive livestock farming have been the low competitivity of products in an industrial market, the intervention of more intermediaries between the farmer and the final consumer, a lack of young people interested in working in the sector, and a lack of policies promoting extensive livestock farming [13]. Hence, many regions are now trying to reward farmers who provide ecosystem services, such as wildfire prevention, with payments [14].

A complex problem arises when establishing the method for calculating payment of the fire prevention service. The key is to find a fair balance between the service provided and payment. For instance, in Catalonia the DCAFRA has offered an annual subsidy for fire prevention actions since 2018 (ORDRE ARP/93/2018, 19 June), which is annually updated (e.g., RESOLUCIÓ ACC/1765/2021, 2 June). The payment depends on two variables: hectares managed and the category of those hectares with regard to fire prevention. Consequently, farmers receive a maximum subsidy of €140/ha/year in the case of SMAs and €70/ha/year in the case of CAs. The difference in the subsidy only considers the designation of SMA and CA and is then weighted according to landscape characteristics such as slope, vegetation palatability, and distance to watering points. In addition, participants in the DCAFRA program receive a fixed amount of €300/year. The payment is made annually, if the initial fuel reduction goal is achieved. If the goal is not achieved, the farmer does not receive the annual payment. However, if farmers foresee that the fuel reduction goal cannot be achieved, they can request a reduction in the total area to be grazed within an SMA or CA making it easier to meet the goal and be eligible for the payment.

Another interesting case that has been in operation for over 15 years is the RAPCA network (Network of Grazed Fuelbreaks of Andalusia) in the region of Andalusia, southern Spain [15]. In this case, payments consist of a fixed initial amount of €300/year, and a variable ranging from €42/ha/year to €90/ha/year depending on grazing difficulty, which

is determined according to type and amount of vegetation, slope, and proximity to the animal shelter. Payment is modulated according to the following levels of compliance with target consumption: 100%, 75%, or 50% compliance. Compliance levels below 50% do not receive remuneration [16].

Silvopastoralism can be a useful tool in the sustainable management of Mediterranean forests from a biological, social, economic, and climate change perspective; in fact, the future of Mediterranean agroforestry is built on the recognition of its multifunctional role [17,18]. Silvopastoralism is a traditional practice which is of great benefit to society (in terms of landscape conservation, fire risk management, and the production of high-quality meat and dairy) and reduces and controls the amount and continuity of vegetation, mainly on the surface layer. In Mediterranean environments, silvopastoralism is also a nature-based solution for reducing greenhouse gas emissions. Firstly, it is among the world's most ancient examples of a coupled human–environment system [19], which relies on naturally growing shrubs and forest vegetation. Thus, in the current context of food system decoupling, due to which most Mediterranean countries have become net protein importers (food and feed) [19], the reinforcement of silvopastoralism is a way of tackling imported greenhouse emissions embedded in livestock farming due to land use changes and derived from agricultural practices in other regions of the world. Furthermore, livestock production in worldwide Mediterranean regions produce double the greenhouse gas emissions than crops [20]. The partial return of livestock to traditional bush and forest grazing, as opposed to only farmed feed, prevents carbon emissions during the entire intensive production life cycle, while liberating enormous amounts of land for crops of direct human consumption (or other land uses) [21]. Thirdly, silvopastoralism's contribution to the generation of fire-resistant forest masses or, at least, reduced wildfire propagation and risk, is critical in avoiding the sudden release of large amounts of greenhouse gases captured and sequestered by vegetation [22,23], and thereby impedes the negative feedback loop between heatwaves, wildfires, and global warming intensification [24,25].

However, the presence of farmers and their sheep and goats has become rare, leading to an increase in fuel loads in forests, and the expansion of fire-prone forests. Thus, the presence of livestock in the landscape has become a shared interest for landowners, farmers, the Catalan Fire and Rescue Service (CFRS), environment rangers, and businesses wanting to sell food products with added value. The accumulation of these factors resulted in the conception of the 'FireFlocks' project (FF) in 2016 (Figure 1).

The overarching aim of the FF project is to reduce the risk of large wildfires through extensive livestock farming in Priority Areas for Fire Prevention. Thus, the specific objectives are to graze the undergrowth forests and shrublands as a means of reducing fuel load within forests and to create open spaces between forested areas. Within the Priority Areas for Fire Prevention, Strategic Management Areas (SMAs) are identified by the CFRS to make the work of suppression easier and safer. SMAs are areas where the CFRS can carry out attack or containment maneuvers to limit the propagation of large forest fires [8]. They require access, safe areas to deploy suppression maneuvers, and a forest structure that prevents ladder fuels from starting crown fires. Therefore, FF promotes extensive grazing in SMAs to reduce fuel load, facilitate suppression operations and avoid the transition from a forest fire to a large forest fire. Due to the extra effort that a farmer must make to graze SMAs, the project also aims to promote the bioeconomy in rural areas, valorizing the farmer's profession, the livestock, and products deriving from the livestock. To this end, the project has created a certification for products produced from the herds so the end consumer is more aware of wildfire risk and the positive impact of consumption habits on wildfire risk reduction (Figure 1). The main idea is to sell more products without increasing the price, despite a recent study showing that a certain target consumer would be willing to pay more for products that serve to aid fire prevention [26].

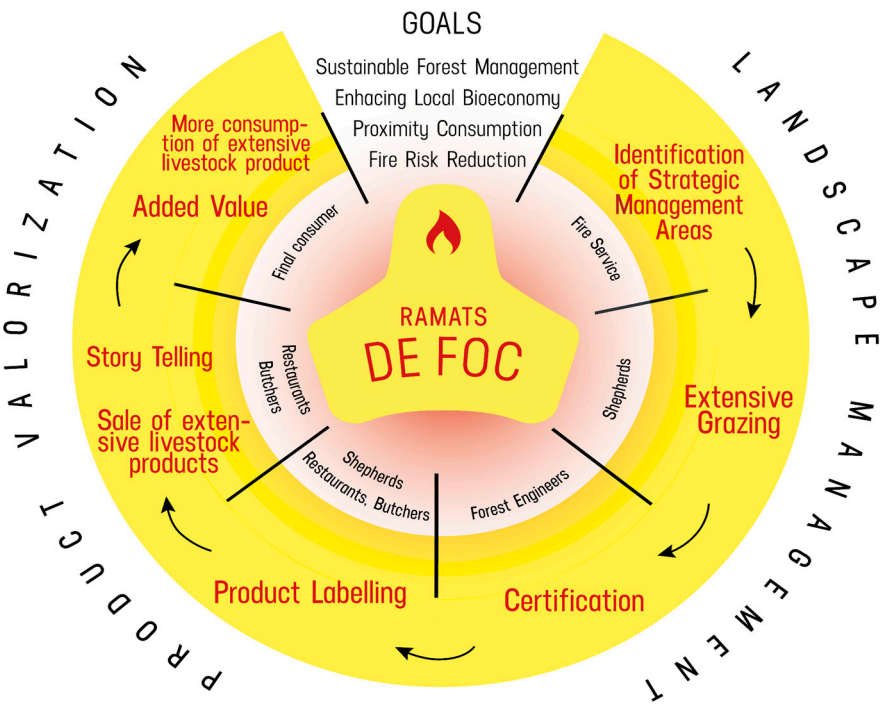

Figure 1. The design and execution process for the Fire Flocks project.

The present article aims to analyse the opinions collected from the FF farmers following the initial five years of the project's implementation. The qualitative study describes and analyses the suggestions made for the future, focusing on farmer's perceptions regarding their role in forest management in the context of current policies, their opinion on the FF project, and the interest in payments for ecosystem services. Previous studies have investigated livestock farmers' opinions towards wood pasture grazing [27,28]. However, for the first time, this article provides a specific qualitative analysis of the opinion of farmers about the FF project.

1.2. Characteristics of Fire Flocks Project

The project has been implemented in the province of Girona, northeastern Spain (42.061179 N, 3.046056 E) (Figure 2). The area has a Mediterranean climate, with the hottest and driest weeks concentrated during the summer [29]. The region is mainly composed of Mediterranean mix forests with dominant species such as: Aleppo pine (*Pinus halepensis*), oak (*Quercus ilex*), and cork oak (*Quercus suber*), with a typical Mediterranean understory of mastic (*Pistacia lentiscus*), heather (*Erica* spp.), rockrose (*Cistus* spp.), and kermes oak (*Quercus coccifera*). The stands are dense, young, and structurally similar [30]. The forest was adapted to traditional pastoral regimes that included low-intensity fires and the land cover was tolerant to natural fires caused by lightning. However, rural abandonment since the 1960s has led to the current landscape, with a high fuel load and the subsequent increase in wildfire risk [7].

The project started as a pilot in the Baix Emporda region, to the east of Girona city (Figure 2), in 2016. Then, in 2018, there was an opportunity to expand the project to the whole province (Figure 2) by linking FF with the DCAFRA forest fire-prevention grazing subsidies. This step helped both FF and the DCAFRA program enhance SMA grazing, pasture monitoring, and certification tasks. Since then, FF has been consolidated in the province, reactivating the rural economy at the same time as reducing fire risk.

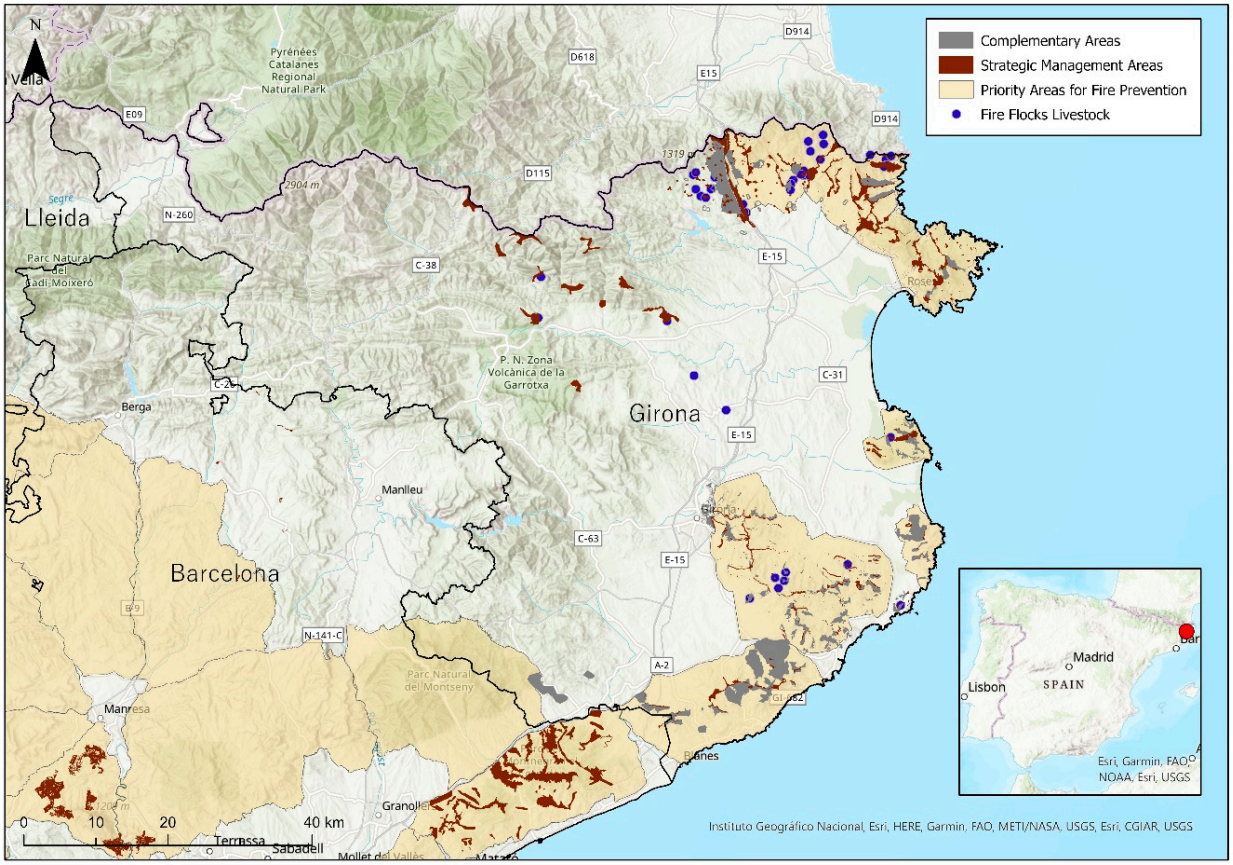

Figure 2. Map of Girona province highlighting Strategic Management Areas (SMAs, orange), Priority Areas for Fire Prevention (beige), and Fire Flocks stands (dots).

The increase in the number of participants and hectares managed since 2016 is favorable (Table 1), accepted by the territory, and represents a positive trend for the rural economy of the region. The farmers[1] participating in the pilot carried out an assessment of its economic impact (data collected between January and June 2017 and 2018). The overall result was positive, indicating an increase of 12% in sales of meat from butchers, and an increase of 40% in restaurants. However, recent incorporations to the project need to be included in the analysis in order to obtain significant results.

Table 1. Initial and current status of the Fire Flocks project.

	Nº of Farmers	Nº of SMAs Managed	Hectares Managed	Nº of Restaurants and Butchers Selling the FIRE Flocks Label
2016	3	4	48	5
2022	20	50	651	35

A total of 20 farmers comprise the FF initiative in 2022, with a fairly diverse profile: four females and 16 males, with an age range of between 31 and 84; more than one third are "young farmers" under 40 years of age (40%), while most of them are between 40 and 60 (45%), and only three are over 60 (15%). A total of 65% of the farmers come from an agrarian family, while 35% are newcomers, some having studied at the Shepherding School of Catalonia. Concerning the characteristics of the stockbreeders, most of them own sheep and goat flocks (75%): five farms have sheep, three have goats, and seven combine both; the incidence of cattle is a minority (25%). On average, the sheep and goat farmers have 620 animals (ranging from 100 to 2200), and the cattle owners have of an average of 103 animals (four owning between 25 and 76, and one owning 360). A total of six farms

rear native breeds, which account for 31% of the livestock included in the project. Overall, 15 farms specialize in meat production, and five produce dairy products (milk, yogurt, and/or cheese) combining it with meat. A total of 65% of the farms produce mutton, 45% produce goat meat (with a much lower volume of product), and 25% beef; 40% of the dairy products are from sheep and 60% from goats.

To date, all but two farmers grazing the SMAs in Girona province are part of the project (Table 1). The two farmers missing do not participate because their activity is livestock growing, with the fattening and final product performed through another farm, a fact that would lose the traceability of their product. The inclusion of new farmers is subject to specific conditions: (a) the capacity to graze in SMAs and CAs; (b) submission of a grazing plan; and (c) provision of a list of the butchers and restaurants where products with the Fire Flocks label can be sold. Most of these new farmers could not join the project because there are no SMAs and CAs close to their location. In 2021, around 30 new farmers, landowners, and butchers in Catalonia expressed an interest in participating in the FF project.

Five years on from its initial launch (2016–2021), the project managers had detected different weaknesses and potential improvements directly affecting the economic and environmental performance of participating farms. It was therefore considered necessary to gather the opinions of the farmers participating in the project regarding the following: the functioning and methodology of the project, the relationship with the public administration, and the role of silvopastoralism as a way of reducing wildfire risk. A review process was undertaken with the aim of gaining further understanding of the extent to which FF is helping farmers to obtain greater socio-economic benefits. The results of the analyses are also fundamental to starting a new five-year cycle with the necessary amendments to make the project more successful and sustainable.

With the objective of understanding the evolution of the project during these initial years, the present article provides a bottom-up analysis of the FF project. This assessment has been conducted based on the evaluation and feedback provided by the farmers involved in the project from several different perspectives.

The FF project is supported by a diverse network of actors and aims to develop a single voice for the community of agents who believe in the strategic role of silvopastoralism for sustainable food systems and (fire)resilient landscapes. Thus, the present research also aims to reach beyond the project and influence managers from the public sector in particular.

2. Methods

A targeted qualitative questionnaire was designed to analyze the opinions of FF farmers after the first five years of implementing the project, as well as their suggestions for the future. All stakeholders were interviewed using the same template questionnaire (Appendix A), which included 34 questions divided into three sections (Figure 3). The first section addressed farmers' perceptions with regards to the potential of using livestock in forest management strategies (nine questions); the second (15 questions) focused on the farmers' perceptions, satisfaction, and motivation to continue with the FF project; and a final section (10 questions) was designed to specifically analyze the relationship between farmers and the public administration allocating payments for ecosystem services. Data were collected during May and June 2021. Different response systems were used for the questions: "yes/no" responses; qualitative scales; a 1-10 quantitative scale; multiple-choice; and short text responses.

A total of 17 out of 20 farmers on the project (85%) responded to the questionnaire. The results were broken down and presented in an integrated way in order to optimize their display and interpretation. Most of the interviews were conducted by phone and took approximately 30 min. However, when a phone call was not possible, farmers received an online questionnaire for self-completion. Data from the interviews were stored in a private database. Data analysis was performed through basic descriptive statistics. Considering the small number of participants and the overall qualitative approach of this case-specific evaluation, no correlation or correspondence analyses were performed.

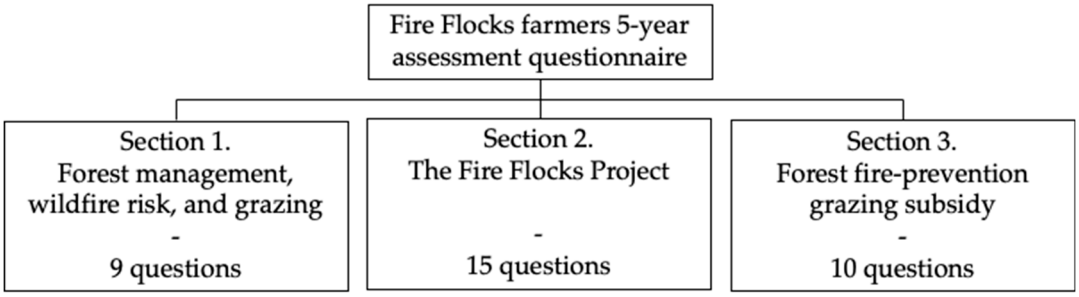

Figure 3. Overview of the Fire Flocks 5-year assessment questionnaire.

In addition to the above, a face-to-face meeting was organized with all of the FF farmers on 15 October 2021, in Colomers (Catalonia) to further discuss the results of the questionnaire and the progress of the project in a more general sense (territorial basis of the project -circumscribed to SMAs a CAs-, access to private land, FF project management, product and brand valorization strategy, product distribution, and relationship with public administration). Although the outcomes from this meeting are not presented in the results, they are used as elements in the discussion and conclusions of the research (Annex S1).

3. Results

Out of a total of 20 farmers, 17 (85%) responded to the questionnaire, these comprising three females and 14 males. Almost half of the group (8) belonged to the young farmers group, aged between 25 and 40; one third (6) were aged 40 to 60, and three were over 60. The respondents represented all types of farms in terms of size (from 30 goats to 1300 heads including goats and sheep), livestock species (sheep, goats, cattle), and produce (milk, dairy, and/or meat).

3.1. Section 1—Forest Management, Wildfire Risk, and Grazing

Table 2 (Q1.1) suggests that while the role of grazing in forest management and wildfire prevention is considered high or very high (Q1.3), these perceptions are complemented by the awareness of *abandonment* of the forests (i.e., their being ignored, neglected . . .) freely stated by ten of the farmers (Q1.2; Appendix A), as well as knowledge of the *essential* (or indispensable, necessary) or *complimentary* contribution of grazing to forest management (Q1.4; 13 responses) (Appendix A). In contrast, societal knowledge regarding the role of grazing livestock for forest management (Q1.9) was seen to be low or very low.

The worrisome status of the forests is aggravated by the perception of increased wildfire risk (Q1.8) and the loss (Q1.7) and reduced presence of livestock (Q1.6) (Figure 4).

3.2. Section 2—The Fire Flocks (FF) Project

Most of the farmers interviewed awarded the project a high valorization (Q2.1, Table 3) and displayed a high motivation to continue (Q2.2), despite economic returns (Q2.5) and farming benefits (Q2.6) from the project being low at the time of the interviews. These results are very relevant for the project, since they indicate that belonging to the FF project represents an intangible value for the farmers; thus, those benefits go beyond material outputs.

Regardless of age, gender, or type of farm, the farmers in the FF are strongly oriented towards a multifunctional approach to herding, with landscape management and wildfire prevention as one of the core missions of the activity (Figure 5). For Q2.4 (Figure 5b), regarding the main motivations for being part of FF, farmers could pick up to two of seven options from a multiple-choice list or add a new one. A total of 12 replied Contribute to forest fire prevention and ten Contribute to landscape management. However, only eight of the 17 respondents stated that FF meets initial expectations (Figure 5a), four indicating that they are not being met, sending a message that the project must evolve. In fact, for six of the farmers there had been no notable change since joining (Figure 5c), although the

majority experienced positive impacts, mainly through Increased pastures and grazing areas and *Visibility*.

Table 2. Section 1 of the questionnaire—number of responses obtained for each value category. Values for questions on a 1–10 scale (from low to high).

Question	Total	Low ← Values → High										
		NA	1	2	3	4	5	6	7	8	9	10
Q1.1 How would you describe the state of the forest where you live?	16	1	3	1	2	1	3		4	1	1	
Q1.3 To what extent do you think grazing contributes to managing the forest in the territory where you live?	17								3	4	3	7
Q1.5 To what extent do you think grazing helps prevent forest fires in the territory where you live?	17								1	6	4	6
Q1.9 Do you think the general public knows about the relationship between the presence of herds and forest fire management?	17		6	1	4	2	3	1				

Responses: Highest value ; 2nd highest value ; other values .

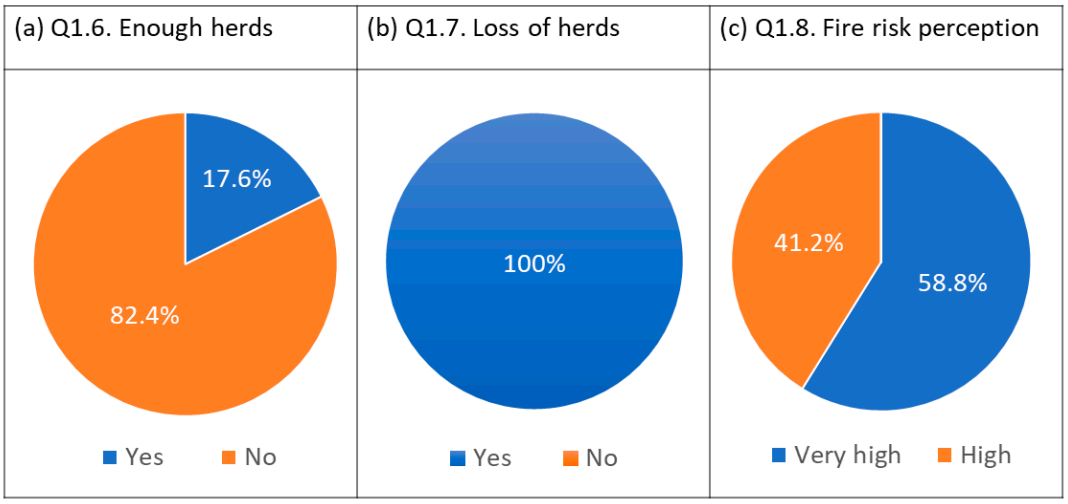

Figure 4. (**a**) Q1.6. Do you think there are enough herds to manage the forests in the territory where you live? (**b**) Q1.7. Do you know of herds being lost in recent decades? (**c**) Q1.8. What is your perception of forest fire risk?

Besides providing material benefits for the farmers, FF is also intended to have an influence on the general public; yet according to the respondents, this is an area that needs to improve (Figure 5d). For more than half (9 out of 17), FF is *slightly* helping to raise awareness amongst the population about the importance of landscape management and forest fires through grazing. That being said, when asked to identify key the strengths of FF (Figure 6a), the farmers highlighted *awareness raising* as the top-scoring strength (11 responses), in addition to *adding value to the products* (9), the *high capacity to transform landscapes and manage forest fires* (9), and *improving the reputation* of the extensive farming sector (8). With regards to weaknesses (Figure 6b), for 11 farmers (65%), the first weakness to tackle is to *ensure a fair economic return for the grazing service* (Figure 6b), followed by the *need to combine grazing with mechanical treatments* for forest understory vegetation, and *increasing the number of shops* in the project's network. Thus, the farmers expressed their concern about building a more effective, economically viable, and dense silvopastoral food chain, from cradle to gate.

Table 3. Section 2 of the questionnaire—number of responses obtained for each value category. Values for questions on a 1–10 scale (from low to high).

Question	Total	NA	1	2	3	4	5	6	7	8	9	10
		Low ← Values → High										
Q2.1 Rate from 1 to 10 your general perception of the FF project	17			1		1	2		3	5	3	2
Q2.2 Indicate from 1 to 10 your level of motivation to continue being part of the project	17				1	1	2		3	2	3	5
Q2.5 To what extent does it bring benefits to your farm in economic terms?	17		2	9	2	1	2					1
Q2.6 To what extent does it bring benefits to your farm in relation to livestock and pasture management?	17		1	5	1	2	4	1	1		1	1
Q2.12 Do you think a shared product transport/distribution system is needed?	17			2	1	1	3	1	3	1	1	4
Q2.13 How do you value the option of creating meat or dairy products with the FF brand?	17			1			4	2	1	3	3	3

Legend: Highest value ; 2nd highest value ; other values .

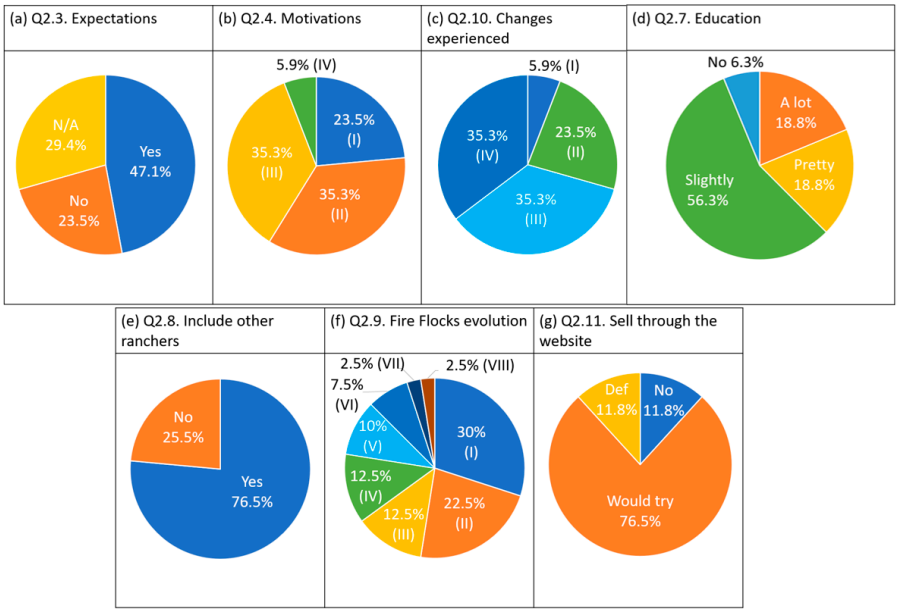

Figure 5. (**a**) Q2.3. Does the project currently meet initial expectations? (**b**) Q2.4. What is your main current motivation to be part of FF? (I) Visibility, (II) Increased pastures and grazing areas, (III) None, (IV) Changes in the size of the herd; (**c**) Q2.10. Have you undergone any changes with regard to the following aspects since you joined FF? (I) Changes in the herd size, (II) Greater visibility, (III) Increased pasture areas, (IV) No changes. (**d**) Q2.7. Do you think FF helps raise awareness regarding the importance of landscape management and forest fires through grazing? (**e**) Q2.8. Do you think FF should include other extensive farmers who also graze outside the SMAs designated by the CFRS? (**f**) Q2.9. How should FF evolve over the next five years for you to continue to be a part of it? (I) Increase and improve economic subsidies, (II) Improved grazing infrastructures, (III) Increased territorial reach, (IV) Access to land, (V) Increase participants in the chain, (VI) Increased sales, (VII) Increase communication and dissemination, (VIII) Increase the facilitator follow-up; (**g**) Q2.11. How do you rate the option of selling a product through the project's website? (No) Not necessary, (Would try) Would try, (Def) Definitely.

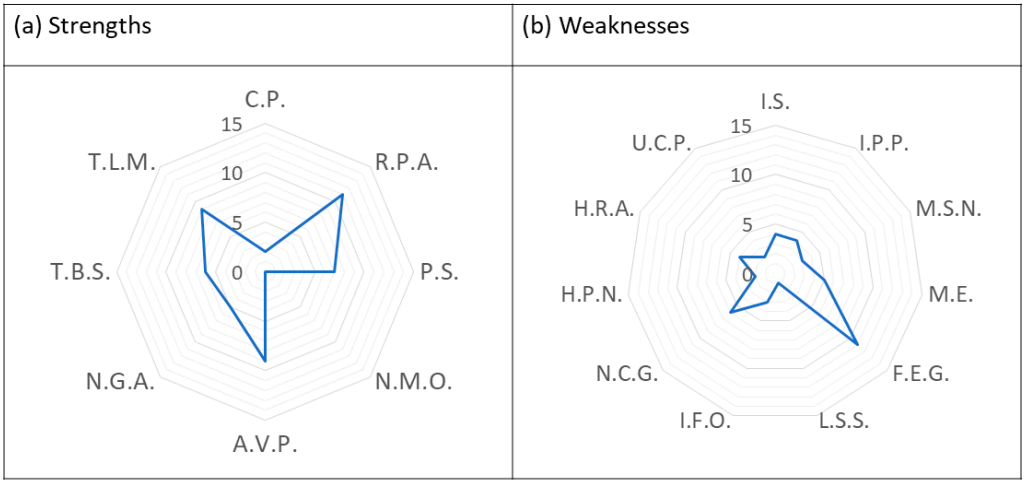

Figure 6. Total number of responses for each category related to the strengths and weaknesses of Fire Flocks. Each respondent was asked to select a maximum of three. (**a**) Strengths: Communicative power (C.P.); Raise Public Awareness (R.P.A.); Prestige for the sector (P.S.); New marketing opportunities (N.M.O.); Adding value to the products (A.V.P.); New grazing areas (N.G.A.); Technical and bureaucratic support (T.B.S.); Transforming landscapes and managing wildfire risk (T.L.M.). (**b**) Weaknesses: Increase sales (I.S.); Increase the price of products (I.P.P.); More farmers in the network (M.S.N); More establishments (M.E.); Fair economic return for the grazing service (F.E.G.); Lack of stable technical management and communication staff (L.S.S); Inaccessible forest owners (I.F.O); Need to combine grazing with mechanical treatments (N.C.G); High presence of non-palatable plants (H.P.N); High restriction of eligible areas according to CFRS (H.R.A); Uncertain continuity of the project due to funding issues (U.C.P).

When addressing the future evolution of FF, the farmers were clearly in favor of grazing outside the SMA designated by the CFRS (Figure 5e). However, for them to continue in FF, a much better forest grazing policy is needed (Figure 5f), increasing the quantity of the subsidies (70%), improving pastoral infrastructures (53%), and facilitating access to land (30%). Furthermore, the participants strongly supported expansion of the project's territories (30%) and selling products through the project's website (Figure 5g), an idea complemented by the notion that it would be interesting to develop a shared product transport/distribution system (Q2.12 in Table 3), and the possibility of creating meat or dairy products under the FF brand (Q2.13).

3.3. Section 3—Forest Fire-Prevention Grazing Subsidy

With regards to farm management, more than half (59%) of the farmers started grazing on new land in order to receive economic support from the subsidy (Figure 7a), and 71% expressed the need to prepare the SMAs for grazing beforehand, such as clearing the understory as the main pre-herding measure (Figure 7b–d). Other suggestions included fencing off the grazing plots and supplying water, as well as obtaining authorization from the landowners.

In terms of the support provided by the DCAFRA program, none of the farmers indicated that grazing was *well paid* and nine said it was *clearly insufficient* (Figure 7e), while seven considered the subsidy to be *slightly fair* or *adequate*. There was, therefore, clear dissatisfaction expressed with the economic compensation, even if, in terms of bureaucracy, most farmers (11) agreed with the criteria used to determine eligibility for the subsidy (Q3.2 in Table 4) and for nine the effort made in terms of paperwork appeared not to be relevant (Q3.3 in Table 4). The most critical point was the technical support provided by the DCAFRA services, which was deemed *bad* (35%) or *regular* (24%) (Figure 7f). In order to find possible ways to improve the subsidy, the farmers were asked to consider the idea of pluri-annuality (e.g., applying for a five-year subsidy) instead of having to apply every

year (Figure 7g); nine farmers were in favor of this idea, but support was not as strong as the project managers expected.

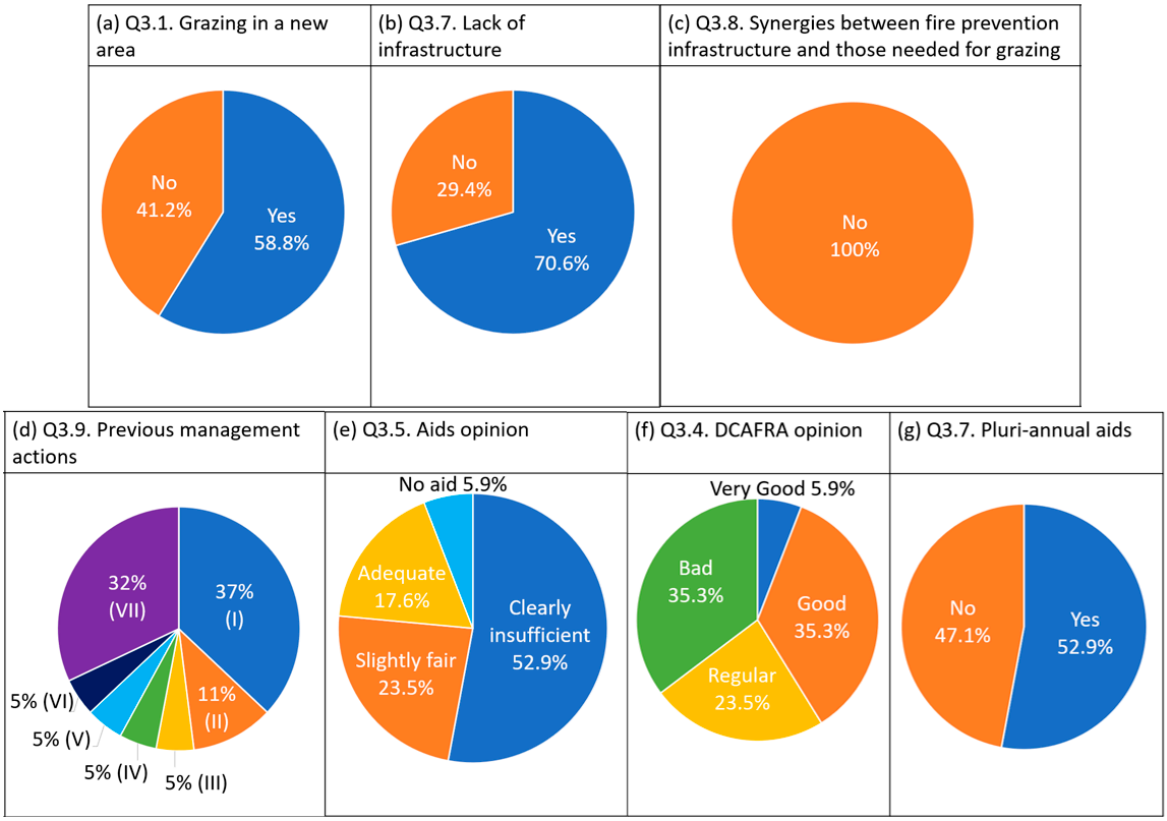

Figure 7. (**a**) Q3.1. Have you started grazing in a new area in order to benefit from the subsidy? (**b**) Q3.7. Do you lack the infrastructure to graze? (**c**) Q3.8. Do you think that SMAs are sufficiently prepared for grazing? (**d**) Q3.9. What kind of pre-herd management would make it easier for you to graze in SMAs? (I) Understory and forest clearing, (II) Fencing (mobile or fixed), (III) Water, (IV) Request authorization from landowners, (V) Management by the farmer, (VI) I don't know, (VII) No response; (**e**) What is your opinion regarding the amount you receive from the subsidy (€/ha)? Categories are ordered from negative (clearly insufficient) to positive (very well paid); (**f**) Opinions regarding technical support provided by the Department of Climate Action, Food and Rural Affairs (DCAFRA); (**g**) Do you think the subsidies should be pluri-annual?

Table 4. Section 3 of the questionnaire—number of responses obtained for each value category. Values for questions on a 1–10 scale (from low to high).

Question	Total	Low ← Values → High										
		NA	1	2	3	4	5	6	7	8	9	10
Q3.2 To what extent do you think the criteria for being eligible to receive the aid are well thought out?	17		2		3	1	5	1	1	3	1	
Q3.3 How much effort does it take to prepare the documentation to be submitted?	16	1	2	1		1	5	1	1	3		2

Legend: Highest value ; 2nd highest value ; other values .

Last but not least, Q3.10 offered participants the option to comment freely on the DCAFRA program. Eight answers were obtained, highlighting the instability of the subsidies and the small and insufficient amounts awarded when compared to certain costs, such

as understory clearing, and the need to expand the program beyond the SMAs and CAs if the aim is to reduce forest fire risk at the regional level.

4. Discussion

The following discussion presents the main strengths and weaknesses, threats, and opportunities of the FF project from the farmers' perspectives, taking to the ground-level challenges that have been analyzed at global scales [31,32]. First of all, it is interesting to note that what has emerged as the core spirit of FF is the relationship between landscape, product, and consumer, thereby consolidating the initial aim of the project to enhance relations and encourage collaboration between different sectors and actors related to extensive livestock farming as an essential strategy for landscape and wildfire risk management. The *raison d'être* of the project remains in force and secure after five years of existence. Beyond this structural consolidation, there are threats that challenge the future development of the project, however. The results indicate a need for evolution in order to strengthen the project's sustainability and make it a transformative tool with a greater impact on the territory.

This discussion presents a review of the core achievements of the FF project and challenges to be addressed, which have been identified from the study and questionnaire results, including the main comments and conclusions from the face-to-face group meetingheld with the farmers in 2021. Below is a list of the main strategic lines according to aspects identified from the five years of the project, which may be used as a future framework for action.

4.1. Core Strengths

(a) Recognition of the suitability and usefulness of grazing for wildfire risk management and the valuable role played by the FF project in boosting this link. The commitment of farmers to wildfire prevention and their motivation to continue in the project lends robustness to FF (Q1.3, Q1.5, Table 2). At the same time, it makes the project less vulnerable to the impacts of internal weaknesses and external threats. This factor stands out as an opportunity for the territorial expansion of FF, but most of all as a potential model to tackle wildfire risk management in the Mediterranean region through a comprehensive public–private strategy [33].

FF is also giving visibility to a new generation of farmers, who are taking the lead in the agrarian sector and adopting a more multifunctional approach to the activity [34]; a new herding archetype (i.e., one which complements food production with landscape management) that is giving a boost to the extensive livestock sector (Figure 6). Thus, farmers are seen by society as contributing to generating landscape resilience, biodiversity conservation, and positive socioeconomic dynamics and impacts [35]. Overall, getting into practice novel models for the primary sector, which are capable of facing the challenges of the 21st-century food markets and business approaches.

(b) FF has a great capacity to give visibility to the extensive livestock sector, raising awareness among the public of their role in land management and fire prevention, and bringing prestige and reputation to the extensive farming collective. This recognition translates into at least two direct positive impacts: on the one hand, increased social valorization of the product they make (even if this is not, so far, reflected in the price); and on the other, empowering and strengthening the sector, and therefore allowing pastoralist farmers to consolidate their collective voice and influence with regard to the public administration and other key actors in the agri-food value chain [35]. As they themselves highlighted in the face-to-face meeting (Annex S1), this is detected as one of the major values of FF after these five years, while, at the same time, there is the perception of a need to drive it further.

(c) The project stands as an agency to promote improvements in the management structure of the farms involved. For instance, it promotes an increase in the amount of grazing land, and the consequent opportunity to increase the herd. This fact is especially important in a context in which access to land constitutes a critical systemic aspect of

the agrarian sector (Figure 7) [36]. Coordination and positive synergy with DCAFRA's public forest fire-prevention grazing program has been an added value in this regard (Q3.4, Figure 7). The continuity of these subsidies in the future is an opportunity for the FF project, especially if public promoters manage to resolve shortcomings and provide further support for the prescribed silvopastoral activity.

(d) The strong consensus, to date, among the farmers involved in FF regarding most of the fundamental aspects approached facilitates project coordination and the identification of actions and strategies that require promotion in order to meet farmers' needs and expectations. For instance, the combination of local farmers' willingness to join the project and the open will of FF farmers to include other farms grazing outside the SMAs designated by the CFRS represents an opportunity for cohesive evolution towards an FF able to broaden its reach in the future. In fact, although the Common Agricultural Policy supports payments for husbandry as a way of fostering environmental protection and biodiversity conservation in HNV farmland and in land that is not easily arable [37], silvopastoralism is not contemplated in the EU's financial support schemes, as forest and shrubs are viewed as unproductive for farming. Therefore, despite the basic public goods and the forest stewardship delivered by forest grazing, so far only limited subnational policies, such as the Catalan aid in SMAs, support silvopastoralism. It is in the hands of the authorities to embrace a more holistic and multifunctional understanding of pastoral activities.

4.2. Challenges to Address

(a) The local/regional scope of adequate grazing areas is an issue for the viability of FF. Grazing in SMAs is hampered by dense forest structures that result from fuel loading and long-term mismanagement [12]. Additionally, there is a lack of preparatory silvicultural interventions and infrastructures to facilitate grazing in the targeted silvopastoral areas and a number of access-to-land bottlenecks [36], especially on private land (i.e., competition by intensive farming, using fields for pig-slurry discharge, forest landowners who reject silvopastoral activities on their properties, smallholdings, and dispersion of the property that impede up-scaling the activity, among others) [38]. The FF pilot implementation phase brought all these issues to light (Figure 6b). In the context of climate emergency, in which SMAs are becoming more strategic for the operational hierarchy [8], new developments in the policy agenda are foreseen in order to overcome the mentioned issues, by taking into account grazing as a nature-based solution to support conventional technologies and methods [10].

(b) Even though economic benefit is not identified as a priority for farmers within the FF project (Table 3), generating additional profits for farms is a relevant aspect that needs to be addressed. Ensuring a fair economic return for the grazing activity in SMAs and CAs can be achieved either by improving the promotion of their products—with strong external conditioning from the market, strongly controlled by the industrialized agri-food sector [39]—or through a consolidated direct payment for the service [16]. The latter currently depends on the conditions of public administration policies, these being external to FF (Q3.5, Figure 7). For this reason, it is worth exploring other means of monetary income for the prescribed grazing services.

(c) Farmers consider that there is still a low social awareness of wildfire risk and the role of grazing as a forest management measure (Q.19, Table 2, Q1.8, Figure 4). This has become a major concern that requires much more action. The project's visibility and potential for raising public awareness must be exploited to ensure a greater impact in the future.

(d) Inadequacy of SMAs for extensive livestock grazing needs. SMAs pose important barriers to the attractiveness and consolidation of FF among farmers (Figure 7). The primary objectives of SMAs are to enable a more efficient emergency response to wildfires in the area and to generate safer opportunities for the crews involved in suppression [40]. Planning includes ensuring the required vegetation structure for the SMA to function efficiently during fires, often associated with treating the vegetation. For a more efficient

implementation of silvopastoralism in SMAs, some multifunctional aspects need to be taken into account, such as water supply, livestock closures for extended periods of grazing, and forest trails to ensure access and safety escape routes. In certain cases, for fire suppression purposes, SMAs should include hydrants or forest trails. Therefore, bringing in farming needs may not generate excessive additional work or costs if planned from the beginning.

(e) FF grazing depends on the designated SMAs and CAs. This limits the expansion of the project to other areas and the addition of new farmers. Limitations on expanding the territorial scope of the project and promoting silvopasture on a larger scale mainly derive from the location and delimitation of a few SMAs within the region, with huge areas of forest not having any. With regard to this, linking the FF project to public grazing subsidies has become a weakness, since grazing in other areas is not subject to funding (Q3.5, Figure 7). Thus, the promotion of silvopasture on a larger scale is not possible under current FF methodology. This is a controversial matter, given that SMAs and CAs are small patches of land within large forest masses in which management policies may differ substantially. On the one hand, the project's current structural link with the public subsidy conditions must be reviewed (Q3.4). This adds to the list of challenges to resolve with regards to the subsidy structure, such as insufficient payment, lack of consensus with the eligibility criteria, and instability of the subsidy, requiring an improvement of the forest grazing policy. And on the other hand, further opportunities should be considered for future development of the project (e.g., payment to the farmers for grazing services, grazing monitoring, and the certification of results) (Q3.7).

4.3. Strategic Action Lines for the Future Framework

Some key aspects must be reviewed with the aim consolidating and expanding FF. This can be done without altering the project's original concept or the opportunities arising from the landscape–product–consumer foundation connected to wildfire prevention. Equally, we propose the following actions for consideration by managers and participants of similar initiatives working towards the same objective and to inform future lines of research aimed at boosting the sector:

(a) Design (or redesign) an operational structure with a resilient functional basis. Bottom-up initiatives, such as FF, require a certain level of self-sufficiency and avoidance of exclusive dependency on public subsidies to carry out essential tasks. This means addressing organizational issues first: governance, renewing the commitment and role of all stakeholders, and incorporating strong new actors to provide tools and resources; these are common challenges facing bottom-up initiatives across southern Europe [11]. On the other hand, pastoralism is increasingly being considered a nature-based solution that, as an environmental service, merits reimbursement [17,41,42]. Payments should be considered as an income to sustain the grazing activity, not as a complement to income from production. This is not yet the case in the current policy frameworks [43].

(b) Project scalability to increase scope. The social base and territorial scope need to be expanded: more herds in more managed forest areas (Q1.6, Figure 4, Q2.8, Figure 5, Q3.1, Figure 7). This requires expansion to a regional scale, which may mean extending the scope of action beyond the designated SMAs and CAs. As a direct consequence, the increased number of products on the market (together with a strong communication campaign) will lead to greater visibility of the brand and consequently generate commercial and social impacts [26].

(c) Promote within the scope of the project, action lines related to facilitating the grazing activity. According to FF farmers, the most urgent challenges facing extensive livestock farming are associated with difficulties implementing the grazing activity (Figure 6b). These include access to land, territorial conditioning, and policy limitations. As the farmers themselves stated in this study, ensuring the presence of herds in the forest is in itself a challenge nowadays, and they need the support of initiatives like FF (Annex S1). In some ways, FF must evolve towards a multisectoral agrosilvopastoral lobby, taking it far beyond

its initial conception, yet this is an internal reflection that all the actors involved must perform and consciously adopt.

5. Conclusions

After five years, Fire Flocks stands as a valid initiative with the very real possibility to grow and achieve a leadership role in supporting landscape management through livestock grazing. The cross-disciplinary approach adopted during this period has allowed for innovative solutions to be applied to different territorial challenges, including sustainable forest management and fire risk reduction, and traditional productive activities to be recovered in rural areas, thereby promoting the bioeconomy and enhancing proximity consumption.

The added value of this qualitative analysis is that it elucidates key elements to be promoted from the perspective and experience of the main stakeholders. Thus, it highlights both strengths and challenges, as well as proposing relevant lines of action that should be considered when defining the FF project strategy for the coming years. These include the positive visibility and recognition that FF awards to silvopastoralism thanks to its contribution to wildfire risk management, while raising awareness of it among the public. There is a need to explore effective collaborations between the private and public sectors and civil society in order to address the future challenges of landscape management, and, more specifically, to support operational grazing structures with a resilient functional basis.

Finally, it is important to highlight that although the results presented here represent a single initiative, they can serve as a precedent for other initiatives in silvopastoralism and extensive livestock farming facing significant threats. Projects such as FF can and must serve as an example to help reverse the current situation.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/land11101718/s1, Annex S1: FIRE FLOCKS farmer's meeting.

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Appendix A

Table A1. Questionnaire template.

Section 1	Forest management, wildfire risk, and grazing.	Type of response
Q1.1	How would you describe the state of the forest where you live?	1–10 low-high scale
Q1.2	Describe the state of the forests in one word.	Free listing
Q1.3	To what extent do you think grazing contributes to managing the forest in the territory where you live?	1–10 low-high scale
Q1.4	Describe the contribution of grazing (to forest management) in one word	Free listing
Q1.5	To what extent do you think grazing helps prevent forest fires in the territory where you live?	1–10 low-high scale
Q1.6	Do you think there are enough herds to manage the forests in the territory where you live?	Yes/No
Q1.7	Do you know of herds that have been lost in recent decades?	Yes/No
Q1.8	What is your perception of the risk of forest fires?	5 levels qualitative low-high scale
Q1.9	Do you think the general public is aware of the relationship between the presence of herds and forest fire management?	1–10 low-high scale
Section 2	The Fire Flocks (FF) Project	
Q2.1	Rate your general perception of the FF project from 1 to 10	1–10 low-high scale
Q2.2	Indicate from 1 to 10 your level of motivation to continue being part of the project	1–10 low-high scale
Q2.3	Does the project currently meet your initial expectations?	Yes/No/DK-NR
Q2.4	What is the main current motivation to be part of FF (select no more than two):	multiple choice: Visibility; Contribute to landscape management; Contribute to forest fire prevention; Increase sales; Reputation
Q2.5	To what extent does it bring benefits to your farm in economic terms?	1–10 low-high scale
Q2.6	To what extent does it bring benefits to your farm in relation to livestock and pasture management?	1–10 low-high scale
Q2.7	Do you think FF helps educate the public regarding the importance of landscape and wildfire management through grazing?	5 levels qualitative scale from 'no' to 'very much'
Q2.8	Do you think FF should include other extensive farmers who graze outside the SMAs designated by the CFRS?	Yes/No
Q2.9	How should FF evolve over the next five years for you to continue to be a part of it?	Multiple choice: Increase and improve economic subsidies; Improved grazing infrastructures; Increased territorial reach; Access to land; Increase in participants in the chain; Increased sales; Increase communication and dissemination; Increased follow-up by PCF
Q2.11	How do you rate the option of selling a product through the project's website?	No/Would try/Definitely
Q2.10	Have you noted any changes since you joined FF regarding the following topics?	Multiple choice: Visibility; Increased pasture areas; Changes herd size; Increased sales; None

Table A1. *Cont.*

Section 1	Forest management, wildfire risk, and grazing.	Type of response
Q2.12	Do you think a shared product transport/distribution system is needed?	1–10 low-high scale
Q2.13	How do you value the option of creating meat or dairy products with the FF brand?	1–10 low-high scale
Q2.14	From the following list, indicate a maximum of 3 strengths you think the FF project has	Multiple choice: Communicative power Raising public awareness Prestige for the sector New marketing opportunities Adding value to the products New grazing areas technical management and bureaucratic support Transforming landscapes and managing wildfire risk
Q2.15	From the following list, indicate a maximum of 3 weaknesses you think the FF project has	Multiple choice: Increase sales Increase the price of products More establishments More shepherds in the network Fair economic return for the grazing service Lack of stable technical management and communication staff Inaccessible forest owners Need to combine grazing with mechanical treatments High presence of non-palatable plants High restriction of eligible areas according to Fire Department Uncertain continuity of the project due to funding issues
Section 3	Forest fire-prevention grazing subsidy	
Q3.1	Have you started to graze in a new area since obtaining aid?	Yes/No
Q3.2	To what degree do you think the eligibility criteria are well thought out?	1–10 low-high scale
Q3.3	What level of effort does it take you to prepare the documentation to present?	1–10 low-high scale
Q3.4	What is your opinion on DCAFRA's technical support in matters of extensive livestock farming and fire prevention?	Multiple choice: Very good; good; regular; bad
Q3.5	What is your opinion regarding the amount of aid you receive (€/ha)	Multiple choice: Clearly insufficient; slightly fair; adequate; no aid.
Q3.6	Do you think that the grants should be pluri-annual (e.g.,: 5 years)	Yes/No
Q3.7	Do you lack grazing infrastructure?	Yes/No
Q3.8	Do you think there are enough synergies between the infrastructure for fire prevention and those needed for pasture	Yes/No
Q3.9	What kind of management prior to the entry of herds would make it easier for you to graze the strategic areas?	Free text
Q3.10	Other comments regarding aid for the maintenance of strategic areas through grazing:	Free text

Notes

[1] We conceive as "farmer" the person who owns and manages a farm (in the case at hand, an extensive or semi-extensive livestock farm), and as "shepherd" the person who deals specifically with the activity of directing the grazing of cattle in the forest. Within the FF project, in most cases the figures of farmer and shepherd are the same person, although there are also a few cases in which the grazing activity is carried out by a subcontractor. In this article, we use either "farmer" or "shepherd" to refer to the livestock actors participating in FF, distinguishing between the activities of farm management or specifically grazing.

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