

Biology, conservation, and promotion of Skylark populations in subalpine and alpine zones of the Beverin-Naturpark, Switzerland

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Keywords

Skylark, *Alauda arvensis*, breeding success, breeding phenology, alpine and subalpine meadows, habitat choice

Introduction

In Switzerland, populations of Skylarks *Alauda arvensis* have decreased not only in the lowlands but also in upland areas (KORNER et al. 2017). The current process of agricultural intensification in the subalpine zone seems to be the main reason for this development (GRAF et al. 2014a). The most recent surveys reveal that the Alps hold a substantial part of the total Swiss population of Skylarks and, therefore, the subalpine and alpine populations are of great value for conservation efforts (GRAF et al. 2014b).

Conservation strategies of subalpine and alpine Skylark populations will be developed within the regional nature park 'Naturpark Beverin'. The following research questions are addressed:

1. Population density and territory distribution

- What are the population densities of Skylarks in the subalpine/alpine zone?
- Are there annual differences in territory occupancy?
- Are there patterns in territory distribution (e.g. clustering)? If so, how can they be explained?

2. Habitat characteristics

- How can densely populated areas be distinguished from low-density sites regarding land-use management and topographical parameters?

3. Breeding biology and population dynamics

- What is the phenology of Skylark breeding activities?
- How many fledglings are produced per territory?
- What are the causes for nest losses?

4. Habitat improvement

- Which measures have already been taken in favour of Skylark populations? Are these effective? Are there additional conservation measures to be initiated within and beyond a regional nature park (socio-economic aspects)?

Methods

Our study area was the Schamserberg (833 ha). This is a gently sloping plateau at 1440 - 2350 m a.s.l., situated in the inner alpine Valley 'Val Schons', within the 'Naturpark Beverin', Switzerland. A large part of the study area is used as nutrient-poor or low-intensity fertile meadow. In higher elevations (above 2100 m a.s.l.) pasture use dominates. A complete census of the vegetation types was conducted in 2016 on-site, using the ALL-EMA-Method (BUHOLZER et al. 2015). In 2016 and 2017 we conducted a skylark territory mapping with four visits (Mai until beginning of July).

In order to improve our understanding of habitat selection of Skylarks, we extended 2017 our study to eight other areas in the subalpine-alpine zone in geographical proximity to our study area. Some of these areas are known to be fairly densely populated by Skylarks, while others have only small Skylark numbers according to previous research (Graf et al. 2014b). In these additional areas we conducted a Skylark census and vegetation mapping using the same methods as in 'Schamserberg'.

Furthermore, we interviewed the local farmers in order to know their opinions about a proposed regional land consolidation and infrastructure project.

Results

- From 2016 to 2017 the number of territories decreased from 212 to 154; this corresponds to a density of 2.55 and 1.85 territories/10 ha, respectively. Reduced densities were mainly observed in the lower areas in 2017.
- A higher Skylark territory density as in the 'Schamserberg' area is hardly found in any other region of Switzerland (MÜLLER & ERNST 2014).
- 2016: Arrival of Skylarks in the study site could not be observed; 16 pairs with documented breeding activity but only 12 nest sites found. Six of them failed (4x predation, 2x snowfall); first eggs laid on 31st May, last nestlings leaved the nest on 20th July. There was no second broods but several replacement broods.
- 2017: Weather conditions much more favourable; Arrival of Skylarks between 25th March and 3rd April; 25 pairs with documented breeding activities observed but only 21 nest sites found (only 3 failed); Most pairs raised two broods. First Brood: First eggs laid on 15th May, last nestlings around 26th June; Second brood: first eggs on the 15th June, last nestlings on 26th July. .
- In both years we didn't observe agricultural work (mowing, hay harvest) to be responsible for any nest loss.

- The analysis of the habitat selection data is still under way. However, we already know that:
 - the majority of the territories is situated in mown meadows (not in pastures),
 - the most common vegetation types (Nardion and Trisetion) are used by Skylarks largely according to their availability (Table 1), and
 - a habitat mosaic of low-intensity and low-nutrient meadows, a small proportion of high vertical structures, and overall very late mowing (ensured by management contracts) seem to be key factors for the good situation of the Skylark population at 'Schamserberg'.

Interviews showed that most farmers are willing to maintain the low-intensity management of their meadows in the important Skylark areas, even after the planned land consolidation and infrastructure improvements.

Highest Skylark-densities are found on moderately steep south-eastern to eastern slopes between 1800 and 2000 m a.s.l.

Study Area	Sub-Area	Elevation	Surface (ha)	Territories 2017 (n)	Density (Terr./10ha)	Polygono- Trisetion	Poion alpinae	Calthion	Caricion davallianae	Caricion ferrugineae	Seslerion	Caricion curvulae	Nardion	Dwarfshrub Heathland	Forest vegetation
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MAIN STUDY AREA

Schamserberg	Blasatscha Oben	2000-2350	111	30	2,7	10,6	14,2			5,3	5,3		53,1		
Schamserberg	Blasatscha Unten	1800-2140	89	29	3,3	33			8,8	8,8			20,9		
Schamserberg	Culmiez Oben	1960-2390	86	31	3,6	20,2	8,3				13,1		41,7		
Schamserberg	Cumiez Unten	1780-2280	103	15	1,5	12,2			5,6	29,9	22,4		15,9		
Schamserberg	Libi	1820-2240	125	50	4,0	38,1	5,6						25,4	14,3	
Schamserberg	Lohn	1440-1960	99	2	0,2	39,2	5,2				6,2		9,3		
Schamserberg	Mathon	1860-2240	109	54	5,0	51,4				2,7	8,1		26,1	5,4	
Schamserberg	Zwölfhorn	1820-2240	111	25	2,3	13,2			9,7	8,8	10,5		31,6	17,5	

ADDITIONAL AREAS

Alp Neaza	Cuolm da Pignia	1950-2360	100	0	0	6		8	21	8			17	8	21
Alp Neaza	Schumanet	2100-2550	100	0	0	15			5	4	5		37	9	
Radons	Tgeps	2140-2490	100	0	0	20	12	6	4	10			20	10	
Radons	Tranter Uals	1840-2090	100	16	1,6	7	6	11	6	21			15	6	
Seeberg	Cufercalhütte	1930-2370	100	13	1,3	9	9		6	35			29		
Seeberg	Roten Turra	1990-2330	100	2	0,2	23	12			13			17		
Tschappina	Oberurmein	1480-1740	100	4	0,4	57	6	6					11		
Tschappina	Rascheins	1630-1910	100	8	0,8	58	10	7					14		

Table 1 : Number of Skylark territories, Skylark density, geographical parameters and vegetation composition in subdivided areas of Schamserberg and in the additional study sites in the region. Vegetation units are only listed when their proportion exceeds 5%.

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