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*Supplement of*

## **Effects of management cessation on hoverflies (Diptera: Syrphidae) across Austrian and Swiss mountain meadows**

**Ronnie Walcher et al.**

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Supplementary material:

Supplementary Table 1: Detailed information for the meadows in the three study regions Central Ennstal, Gr. Walsertal and Val Müstair.

		Mean annual temperature	Management type	Meadow size [m <sup>2</sup> ]	Altitude (meter a.s.l.)	Coordinates
Austria	Central Ennstal	6.9°C	managed	2731,74	552	47.668317, 14.596793
			managed	5154,08	805	47.517175, 14.125302
			managed	467,31	764	47.529405, 14.073971
			abandoned	1576,37	552	47.667813, 14.595772
			abandoned	656,11	545	47.663569, 14.594285
			abandoned	447,45	769	47.529468, 14.073386
Austria	Großes Walsertal	5.7°C	managed	3520,8	1250	47.250372, 9.972838
			managed	4726,5	1120	47.250044, 9.968447
			managed	5067,07	1100	47.249519, 9.969198
			abandoned	807,98	1200	47.250590, 9.970013
			abandoned	1708,84	1125	47.249461, 9.971204
			abandoned	4301,63	1050	47.249271, 9.968490
Switzerland	Val Müstair	5.9°C	managed	1152,78	1740	46.616116, 10.371446
			managed	3460,43	1730	46.615847, 10.371443
			managed	1167,99	1724	46.619523, 10.358019
			abandoned	1110,47	1740	46.616181, 10.370849
			abandoned	602,11	1730	46.616052, 10.370463
			abandoned	1087,17	1844	46.620209, 10.424658

Supplementary Table 2: Number of hoverfly individuals from the three study regions (Central Ennstal, Gr. Walsertal and Val Müstair).

Aphidophagous species are emphasized with an “ \* ”.

	Region						
	Central Ennstal		Gr. Walsertal		Val Müstair		
	Managed	Abandoned	Managed	Abandoned	Managed	Abandoned	
<i>Caliprobola speciosa</i>	0	0	0	0	1	1	0
<i>Cheilosia impressa</i>	1	0	0	1	0	0	1
<i>Cheilosia personata</i>	1	0	0	0	0	0	0
<i>Cheilosia sp.</i>	1	0	0	0	0	0	0
<i>Chrysotoxum cautum</i> *	0	0	0	1	0	0	0
<i>Episyrphus balteatus</i> *	5	4	4	1	1	0	2
<i>Epistrophe diaphana</i> *	0	0	0	2	1	0	0
<i>Eristalis jugorum</i>	0	0	0	2	0	0	0
<i>Lapposyrphus lapponicus</i> *	6	14	14	0	0	0	1

<i>Melanostoma mellinum</i> *	7	0	1	0	10	28
<i>Melanostoma scalare</i> *	0	0	8	12	0	0
<i>Merodon equestris</i>	2	1	0	0	0	0
<i>Myathropa florea</i>	0	1	0	0	1	0
<i>Orhonevra geniculata</i>	0	1	0	0	0	0
<i>Parasyrphus annulatus</i> *	0	0	0	0	0	1
<i>Paragus</i> sp.	1	0	0	0	0	0
<i>Pelecocera tricincta</i>	0	0	1	0	0	0
<i>Pipizella</i> sp.	2	0	0	0	0	0
<i>Pipizella viduata</i> *	1	0	1	0	0	0
<i>Pipizella virens</i> *	1	1	1	0	0	0
<i>Platycheirus albimanus</i> *	0	0	0	0	0	1
<i>Platycheirus sticticus</i> *	0	0	0	0	1	0
<i>Rhingia borealis</i>	0	1	0	0	0	0
<i>Scaeva pyrastris</i> *	0	0	0	0	1	0
<i>Sphaerophoria interrupta</i> *	1	0	0	0	0	2

<i>Sphaerophoria scripta</i> *	7	8	5	2	1	2
<i>Sphegina sibirica</i>	0	1	0	0	0	0
<i>Syrpitta pipiens</i>	3	1	0	0	0	3
<i>Syrphus ribesii</i> *	1	0	0	0	0	0
<i>Volucella bombylans</i>	2	0	0	0	3	0

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Supplementary Table 3: Presence/absence of plant species in the three study regions Central Ennstal, Val Müstair and Großes Walsertal.

	Region					
	Central Ennstal		Val Müstair		Gr. Walsertal	
	Managed	Abandoned	Managed	Abandoned	Managed	Abandoned
<i>Acer pseudoplatanus</i>	1	0	0	0	1	0
<i>Achillea millefolium</i> agg.	1	1	1	1	1	1
<i>Acinos arvensis</i>	0	0	0	0	1	0
<i>Aegopodium podagraria</i>	1	1	0	0	0	0
<i>Agrostis capillaris</i>	1	1	0	0	0	0
<i>Ajuga genevensis</i>	1	0	0	0	0	0
<i>Ajuga reptans</i>	0	1	0	0	0	0
<i>Alchemilla monticola</i>	0	0	1	0	1	1
<i>Allium carinatum carinatum</i>	1	1	1	1	1	1
<i>Allium lusitanicum montanum</i>	1	0	0	0	0	0
<i>Alopecurus pratensis</i>	0	0	0	1	0	0
<i>Anthericum liliago</i>	0	0	0	0	0	1

<i>Anthericum ramosum</i>	0	1	0	0	0	1
<i>Anthoxanthum odoratum</i>	1	1	1	1	1	1
<i>Anthriscus sylvestris</i>	0	0	0	1	1	0
<i>Anthyllis vulneraria carpatica</i>	1	0	1	0	1	0
<i>Aquilegia atrata</i>	1	0	0	0	1	1
<i>Arabidopsis halleri</i>	0	1	0	0	0	0
<i>Arabis ciliata</i>	0	0	1	0	0	0
<i>Arabis hirsuta</i>	0	0	1	0	1	0
<i>Arenaria serpyllifolia</i>	1	0	0	0	0	0
<i>Arrhenatherum elatius</i>	1	1	1	1	1	1
<i>Astrantia major major</i>	1	1	0	0	1	1
<i>Avenula pubescens pubescens</i>	1	1	0	0	0	0
<i>Betonica alopecuros</i>	1	1	0	0	0	0
<i>Betonica officinalis</i>	1	1	0	0	1	0
<i>Betula pendula</i>	1	0	0	0	0	0
<i>Botrychium lunaria</i>	0	0	1	0	0	0

<i>Brachypodium pinnatum</i>	1	1	1	1	1	1
<i>Briza media</i>	1	1	1	1	1	1
<i>Bromus erectus</i>	1	1	1	1	1	1
<i>Bupthalmum salicifolium</i>	1	1	0	0	1	1
<i>Campanula glomerata glomerata</i>	0	0	1	0	0	0
<i>Campanula patula</i>	0	0	0	0	0	0
<i>Campanula rapunculoides</i>	0	1	0	0	0	0
<i>Campanula rotundifolia</i>	1	1	0	1	1	1
<i>Campanula scheuchzeri</i>	0	0	1	1	0	0
<i>Carduus defloratus viridis</i>	1	0	0	0	0	0
<i>Carex alba</i>	1	1	0	0	0	1
<i>Carex caryophyllea</i>	1	0	0	0	0	0
<i>Carex ericetorum</i>	0	0	1	1	0	0
<i>Carex flacca</i>	1	1	1	0	0	0
<i>Carex ornithopoda ornithopoda</i>	1	1	1	0	0	0
<i>Carex panicea</i>	1	1	0	0	0	0



<i>Carex spicata</i>	1	1	0	0	0	0
<i>Carex sylvatica</i>	0	0	0	0	1	0
<i>Carlina acaulis acaulis</i>	1	0	1	0	1	1
<i>Centaurea jacea</i>	1	1	1	0	1	1
<i>Centaurea scabiosa scabiosa</i>	1	1	1	0	1	1
<i>Cephalanthera damasonium</i>	0	1	0	0	0	0
<i>Cerastium holosteoides</i>	1	0	1	1	0	0
<i>Chaerophyllum aureum</i>	0	1	0	0	0	0
<i>Clinopodium vulgare</i>	1	1	0	0	1	1
<i>Colchicum autumnale</i>	0	1	1	0	1	1
<i>Convolvulus arvensis</i>	0	1	1	0	0	0
<i>Crepis biennis</i>	0	0	0	0	0	0
<i>Cruciata laevipes</i>	0	1	0	1	0	0
<i>Cyclamen purpurascens</i>	0	1	0	0	0	0
<i>Cynosurus cristatus</i>	0	0	1	0	1	0
<i>Dactylis glomerata</i>	1	1	1	1	1	0

*Dianthus carthusianorum*

<i>carthusianorum</i>	1	0	1	0	0	0
<i>Dianthus deltoides</i>	0	0	0	1	0	0
<i>Echium vulgare</i>	0	0	0	0	1	0
<i>Epipactis atrorubens</i>	0	0	0	0	0	1
<i>Erica carnea</i>	0	1	0	0	0	0
<i>Euphorbia cyparissias</i>	1	1	1	0	0	0
<i>Euphrasia officinalis rostkoviana</i>	1	0	0	0	0	0
<i>Festuca pratensis</i>	1	1	0	0	1	0
<i>Festuca rubra rubra</i>	0	0	1	1	1	1
<i>Festuca rupicola</i>	1	1	0	0	0	0
<i>Festuca valesiaca</i>	0	0	1	1	0	0
<i>Fragaria viridis</i>	0	0	1	1	1	0
<i>Fraxinus excelsior</i>	1	1	0	0	0	0
<i>Galeopsis tetrahit</i>	0	0	0	0	0	0
<i>Galeosis speciosa</i>	0	1	0	0	0	0

<i>Galium album</i>	1	1	0	1	1	1
<i>Galium aparine</i>	0	0	0	1	0	0
<i>Galium pumilum</i>	1	1	1	1	1	1
<i>Gentiana verna</i>	1	0	1	0	0	0
<i>Gentianella aspera</i>	0	0	1	0	0	0
<i>Geranium phaeum phaeum</i>	0	0	0	0	0	0
<i>Geranium pratense</i>	0	0	0	1	0	0
<i>Glechoma hederacea</i>	1	0	0	0	0	0
<i>Gymnadenia conopsea conopsea</i>	1	1	1	0	0	0
<i>Helianthemum nummularium</i>						
<i>obscurum</i>	1	1	1	1	0	1
<i>Helleborus niger</i>	0	1	0	0	0	0
<i>Hepatica nobilis</i>	0	0	0	1	0	0
<i>Heracleum sphondylium</i>	0	0	1	0	1	0
<i>Hieracium pilosella</i>	1	0	1	0	1	0
<i>Hieracium spec.</i>	1	0	0	1	1	0

<i>Hippocrepis comosa</i>	1	1	1	1	1	1
<i>Holcus lanatus</i>	1	0	0	0	1	0
<i>Hypericum perforatum</i>	0	1	0	0	0	0
<i>Knautia arvensis arvensis</i>	1	1	1	1	0	0
<i>Knautia drymeia intermedia</i>	1	1	1	0	0	0
<i>Knautia maxima</i>	0	0	0	0	0	0
<i>Koeleria pyramidata pyramidata</i>	1	1	1	0	0	0
<i>Lamium album</i>	0	0	0	1	0	0
<i>Laserpitium krapfii gaudinii</i>	0	0	0	1	0	0
<i>Laserpitium latifolium</i>	1	1	0	0	0	1
<i>Lathyrus latifolius</i>	0	0	0	1	0	0
<i>Lathyrus pratensis</i>	1	1	0	1	1	1
<i>Leontodon hispidus hispidus</i>	1	1	1	0	1	0
<i>Leucanthemum ircutianum</i>	1	0	1	0	1	0
<i>Lilium bulbiferum bulbiferum</i>	0	0	0	0	0	0
<i>Linum catharticum</i>	1	0	0	0	1	0

<i>Lotus corniculatus</i>	1	1	1	1	1	1
<i>Luzula multiflora</i>	0	0	0	0	1	0
<i>Medicago falcata</i>	1	1	0	0	0	0
<i>Medicago lupulina</i>	1	0	0	0	0	0
<i>Melampyrum sylvaticum</i>	0	1	1	1	0	0
<i>Molinia caerulea</i>	1	1	0	0	1	1
<i>Myosotis alpestris</i>	0	0	1	0	0	0
<i>Myosotis arvensis</i>	0	0	0	1	0	0
<i>Nardus stricta</i>	0	0	1	0	0	0
<i>Onobrychis montana</i>	0	0	1	0	0	0
<i>Origanum vulgare vulgare</i>	0	1	0	0	0	0
<i>Orobanche gracilis</i>	1	0	0	0	0	0
<i>Phleum pratense</i>	0	0	0	0	1	0
<i>Phyteuma orbiculare</i>	1	1	1	1	1	1
<i>Pimpinella major major</i>	1	1	0	0	0	0
<i>Pimpinella saxifraga saxifraga</i>	1	1	1	1	0	0

<i>Plantago lanceolata</i>	1	1	1	0	1	1
<i>Plantago media</i>	0	0	1	0	1	0
<i>Platanthera bifolia</i>	0	0	0	0	1	0
<i>Poa angustifolia</i>	1	1	1	1	1	0
<i>Poa trivialis</i>	0	0	1	0	0	0
<i>Polygala alpestris</i>	0	0	1	0	0	0
<i>Polygala chamaebuxus</i>	1	1	0	1	0	0
<i>Polygala comosa</i>	1	0	1	0	1	0
<i>Polygonatum odoratum</i>	0	0	1	0	0	0
<i>Potentilla erecta</i>	1	1	1	1	1	1
<i>Primula elatior</i>	0	1	1	1	1	1
<i>Prunella grandiflora</i>	1	1	0	0	1	1
<i>Ranunculus acris acris</i>	1	0	0	0	0	0
<i>Ranunculus bulbosus</i>	1	0	0	0	0	0
<i>Ranunculus nemorosus</i>	1	1	1	0	1	1
<i>Ranunculus repens</i>	0	0	0	0	0	0

*Rhinanthus alectorolophus*

<i>alectorolophus</i>	0	1	1	1	1	0
<i>Rhinanthus glacialis</i>	1	1	0	0	0	0
<i>Rhinanthus minor</i>	1	0	1	0	0	0
<i>Rosa spec.</i>	0	0	0	1	0	0
<i>Rubus idaeus</i>	0	0	0	1	0	0
<i>Rumex acetosa</i>	1	1	0	0	1	0
<i>Salvia verticillata</i>	1	1	0	0	1	0
<i>Sanguisorba minor</i>	1	0	1	1	1	0
<i>Scabiosa columbaria</i>	1	0	0	0	1	0
<i>Scabiosa lucida</i>	0	0	0	0	1	0
<i>Sesleria caerulea</i>	1	1	0	1	1	0
<i>Silene nutans nutans</i>	1	0	1	0	0	0
<i>Silene vulgaris vulgaris</i>	0	0	0	1	1	0
<i>Sorbus aucuparia</i>	0	0	0	1	0	0
<i>Stellaria graminea</i>	0	0	0	0	0	0

<i>Taraxacum officinale</i> agg.	1	1	1	0	1	0
<i>Teucrium chamaedrys</i>	0	1	1	0	0	0
<i>Thesium alpinum</i>	0	0	1	0	0	0
<i>Thymus pulegioides pulegioides</i>	1	1	1	1	1	1
<i>Tragopogon orientalis</i>	1	0	1	1	0	0
<i>Tragopogon pratensis</i>	0	0	0	0	1	1
<i>Trifolium arvense</i>	0	0	1	0	0	0
<i>Trifolium dubium</i>	0	0	1	0	1	0
<i>Trifolium medium medium</i>	0	1	0	0	0	0
<i>Trifolium montanum</i>	1	1	1	1	1	1
<i>Trifolium pratense pratense</i>	1	0	1	0	1	0
<i>Trifolium repens</i>	1	0	1	0	1	0
<i>Trisetum flavescens</i>	1	1	1	0	1	0
<i>Trollius europaeus</i>	0	1	1	0	0	0
<i>Vaccinium myrtillus</i>	0	0	1	1	1	1
<i>Valeriana officinalis</i>	0	1	1	1	1	1



<i>Verbascum spec.</i>	0	0	0	1	0	0
<i>Veronica chamaedrys chamaedrys</i>	1	1	0	0	1	0
<i>Veronica teucrium</i>	0	0	0	1	0	0
<i>Vicia cracca</i>	1	1	1	1	1	0
<i>Vicia sepium</i>	0	1	0	1	0	0
<i>Vincetoxicum hirundinaria</i>	1	1	0	0	0	1
<i>Viola hirta</i>	1	1	0	0	0	0
<i>Viola rupestris</i>	1	1	0	0	0	0
<i>Viola spec.</i>	0	0	1	1	0	0

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