SUPPLEMENTARY INFORMATION

Table S1 Morphological diagnostic field characters of *S. helvetica*, *S. purpurea* and the hybrid (see also Hörandl et al., 2012).

	S. helvetica	***S. purpurea***	***hybrid***
leaf shape	ovate to broad lanceolate, max. width in the center	small lanceolate to linear apikal part	Intermediate
leaf margin	revolute, entire or with small teeth along the leaf	smooth, serrate only in the upper part	Intermediate
lower surface of leaves	densely tomentose (hairs covering surface, therefore it appears white or grey)	glabrous, pruinose	sparsely hairy (hairs not covering the surface, therefore it appears green); pubescent
Buds	globose to ellipsoid, hairy	elongated, flattened, glabrous	Intermediate
capsules	Stipitate, elongate	Sessile, ellipsoid	intermediate
style	long	very short	intermediate

Table S2 Quantitative characters measured on herbarium vouchers and used for calculating ratios.

Morphometric characters	**Description**
1. FK_Länge	Length of capsule (mm)
2. FK_Stiel	Length of stipe of capsule (mm)
3. Griffellänge	Length of style (mm)
4. K_Laenge	Bud length (mm)
5. K_Breite	Bud width (tangential to the branch; mm)
6. K_Dicke	Bud thickness (in a right angle to the branch; mm)
7. LB_Blattstiel	Petiole length of adult leaves (mm)
8. LB_Laenge	Length of adult leaves (mm)
9. LB_Breite	Greatest width of adult leaves (mm)
10. LB_LaengeZuBreite	Distance from adult leaf blade base to the greatest leaf width (mm)
11. LB_Seitennerven	Number of main lateral veins on adult leaf
12. LB_oZaehnung	Number of teeth on the leaf margin above the greatest width
13. LB_uZaehnung	Number of teeth on the leaf margin below the greatest width
14. PB_Blattstiel	Petiole length of primary leaves (mm)
15. PB_Laenge	Length of primary leaves
16. PB_Breite	Greatest width of primary leaves
17. PB_LaengeZuBreite	Distance from primary leaf blade base to the greatest leaf width

Table S3 Overview of the applied microsatellite loci and detailed specification of the reaction conditions.

Microsatellite locus	Primer sequences 5'-3' (forward, reverse)	Repeat	Observed product size (bp)	Amplification conditions[1] (°C)	Label	Multiplex
ORPM 301	CAAAGATGGTGACTGGATGC AGCCTATTGCTTCCGATCCT	[CT]5	S. p. monomorphic S. h. 175-207	60/55	NED	1
ORPM 446	GGGCTGCAGACAAATTAAGG TGGGACATGCTCCATGGTAT	[CT]3...[CT]4	S. p. 227-241 S. h. 229-257	60/55[2]	VIC	1
GCPM 1255	GAACCTTAAAACCAGaaCCC gagccacagaAatActgctc	[AG]23	S. p. 188-207 S. h. 190-206	60/55	PET	2
GCPM 1413-2	TGAAGGAGAAGAAAAGCAAG CATAACTGCTCCACCTGAGT	[GAC]8	S. p. 162-166 S. h. 157-191	60/55	NED	3
GCPM 1812	TGCTTCTCTATTTCTAGGCG GCTGTTACTGTCTCTCCAGC	[GGT]7	S. p. 192-213 S. h. 189-216	60/60[4]	VIC	3
GCPM 2041-1	AGACATTTCTGTTTAGCCGA TCtTCTTTGTTGATGTctGGT	[CTG]9	S. p. 207-218 S. h. 204-224	S. p. 60/55 S. h. and hybrid 55/55[3]	FAM	3
SB 199	CTATTTGGTCTCAATCACCTT CTTTACCTCAGAAAATCCAGA	[TG]11CG[TG]6	S. p. 106-112 S. h. 97-120	S. p. 60/55 S. h. 60/60 Hybrid 60/55[4]	FAM	1
SB 233	AAATTACCGTCCAACTAAAGA CATTAGCCATGAACAAGTAAA	[TA]2[TGTGCG]4[TG]9	S. p. 192-218 S. h. 188-238	S. p. 65/65 S. h. 60/55[4] Hybrid 60/50	FAM	2
gSIMCT024	TCATTTGCTCGATGAGGTTG GTGGTAGTTGCAAAAGGGGA	[CT]10	S. p. 287-303 S. h. 293-350	S. p. 65/65 S. h. 60/55 Hybrid 60/60	FAM	2

[1]The number before the slash denotes the initial annealing temperature in the first five cycles, the number after the slash denotes the annealing temperature in the touchdown-step. S. p. = *Salix purpurea*, S. h. = *S. helvetica*.
[2]Elongation set to 40 s.
[3]Elongation set to 45 s.
[4]Final step with 25 cycles.

Table S4 Niche-differentiation of species along Ellenberg's gradients for 58 plots from Rhône Glacier with hybrids divided in F_1 hybrids and later generation hybrids (ShybF1=F_1hybrid, ShybLG=later generation hybrid, Spur=*S. purpurea*, Shel=*S. helvetica*). Significant differences are in bold.

	ShybLG-ShybF1	ShybLG-Spur	ShybLG-Shel	ShybF1-Spur	ShybF1-Shel	Spur-Shel
T	0.49	**0.21**	0.79	**0.14**	0.46	**0.22**
R	0.70	**0.37**	0.60	**0.25**	0.63	**0.36**
F	0.60	0.60	0.60	0.65	0.54	0.83
N	0.65	**0.43**	**0.43**	**0.25**	0.45	**0.43**

Table S5 Niche-differentiation of species along Ellenberg's gradients for 58 sampling plots taken at the Rhône Glacier forefield plus 92 additional reference plots of parent individuals (46 containing *S. helvetica* and 46 containing *S. purpurea*) randomly selected from the Austrian Vegetation Database with hybrids divided in F_1 hybrids and later generation hybrids (ShybF1=F_1hybrid, ShybLG=later generation hybrid, Spur=*S. purpurea*, Shel=*S. helvetica*). Significant differences are in bold.

	ShybLG-ShybF1	ShybLG-Spur	ShybLG-Shel	ShybF1-Spur	ShybF1-Shel	Spur-Shel
T	0.86	**0.20**	**0.46**	**0.17**	**0.49**	**0.17**
R	0.89	**0.30**	0.70	**0.26**	0.63	**0.29**
F	0.92	**0.34**	0.57	**0.31**	**0.53**	**0.46**
N	0.79	**0.20**	0.67	**0.09**	0.58	**0.16**

Table S6 Niche-differentiation of species along Ellenberg's gradients for 58 plots from Rhône Glacier (Shyb=hybrid, Spur=*S. purpurea*, Shel=*S. helvetica*). Significant differences are in bold.

	Shyb-Spur	Shyb-Shel	Spur-Shel
T	**0.21**	0.72	**0.22**
R	**0.34**	0.64	**0.35**
F	0.73	0.64	0.83
N	**0.40**	**0.45**	**0.43**
pH	**0.40**	0.66	**0.43**
WRC	0.74	**0.58**	0.60

Table S7 Niche-differentiation of species along Ellenberg's gradients for 58 sampling plots taken at the Rhône Glacier forefield plus 92 additional reference plots of parent individuals (46 containing *S. helvetica* and 46 containing *S. purpurea*) randomly selected from the Austrian Vegetation Database (Shyb=hybrid, Spur=*S. purpurea*, Shel=*S. helvetica*). Significant differences are in bold.

	Shyb-Spur	Shyb-Shel	Spur-Shel
T	**0.19**	**0.48**	**0.17**
R	**0.28**	0.68	**0.29**
F	**0.33**	0.55	**0.46**
N	**0.19**	0.65	**0.16**

Figure S1 Boxplots of ratios of morphometric characters of *S. helvetica*, *S. purpurea* and the hybrid (middle plots).

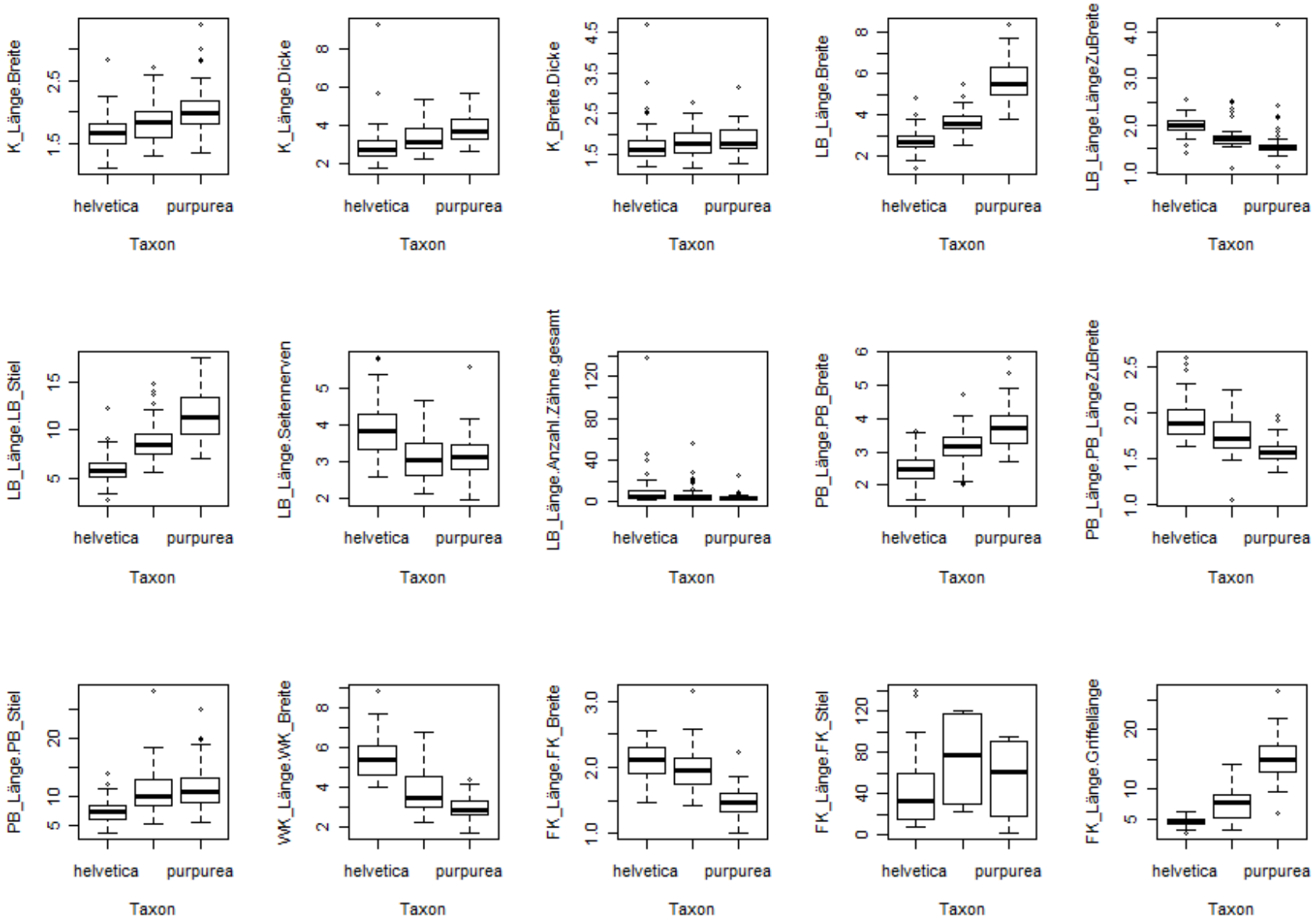

Figure S2 Overview of the location of the 58 observation plots at the sampling site on the Rhône Glacier forefield. Pure stands of *S. purpurea* were sampled in the valley apart from the glacier forefield (left insert). The location of the Rhône Glacier in Switzerland is given in the right insert. (Image source: © 2011 Tele Atlas, accessed 12/2011).

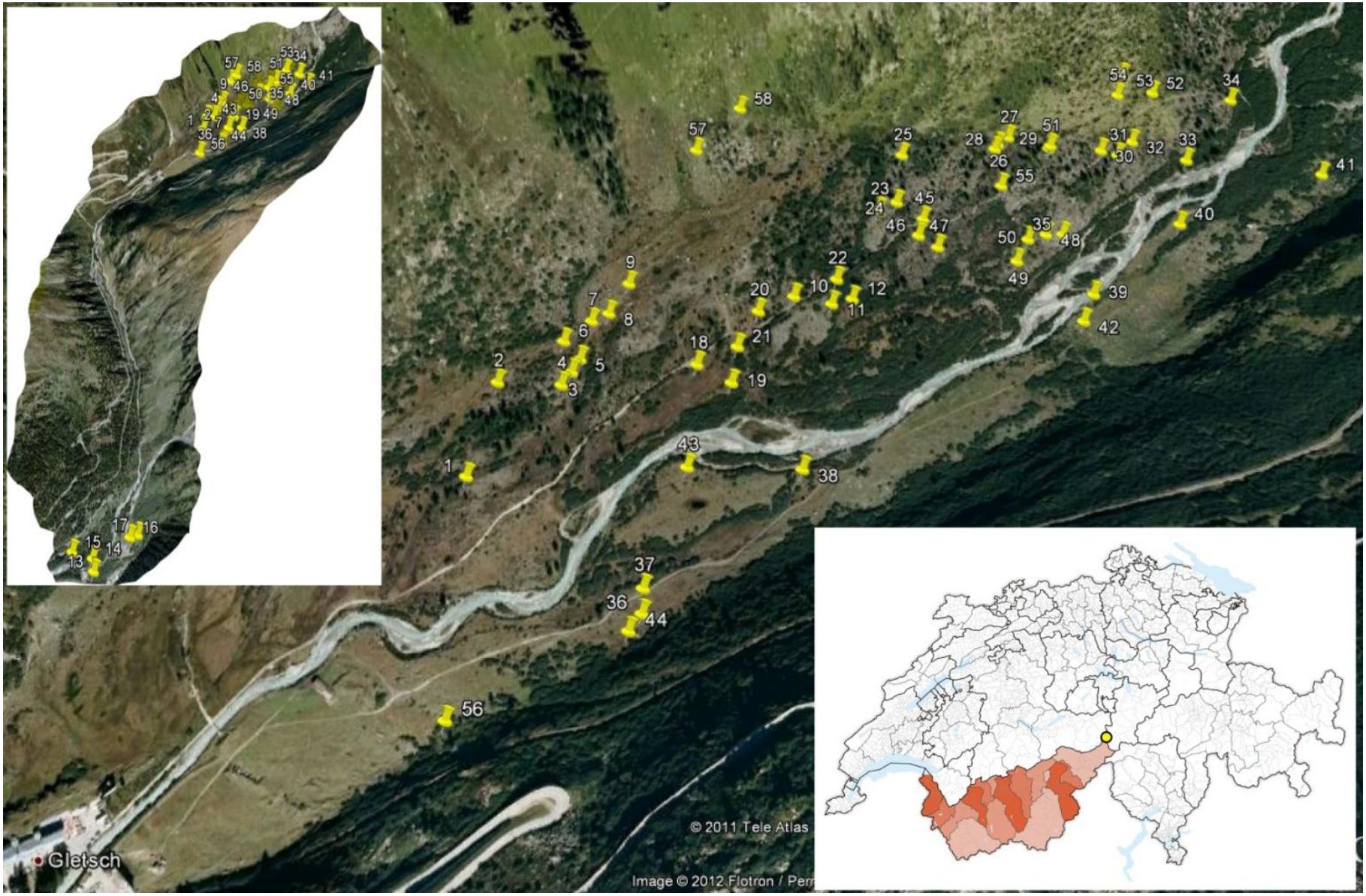

Figure S3 Smoothed density of species abundances along six environmental gradients as calculated from data of 58 sampling plots at the Rhône Glacier forefield. Ellenberg's T, R, F and N values are indicator values of temperature, pH, soil moisture and nutrient availability as computed from the accompanying vegetation. The curves represent densities of *S. helvetica* (green), *S. purpurea* (red), F_1 hybrids (dark blue) and later generation hybrids (steel-blue). The dashed curve represents the density of the respective environmental variable.

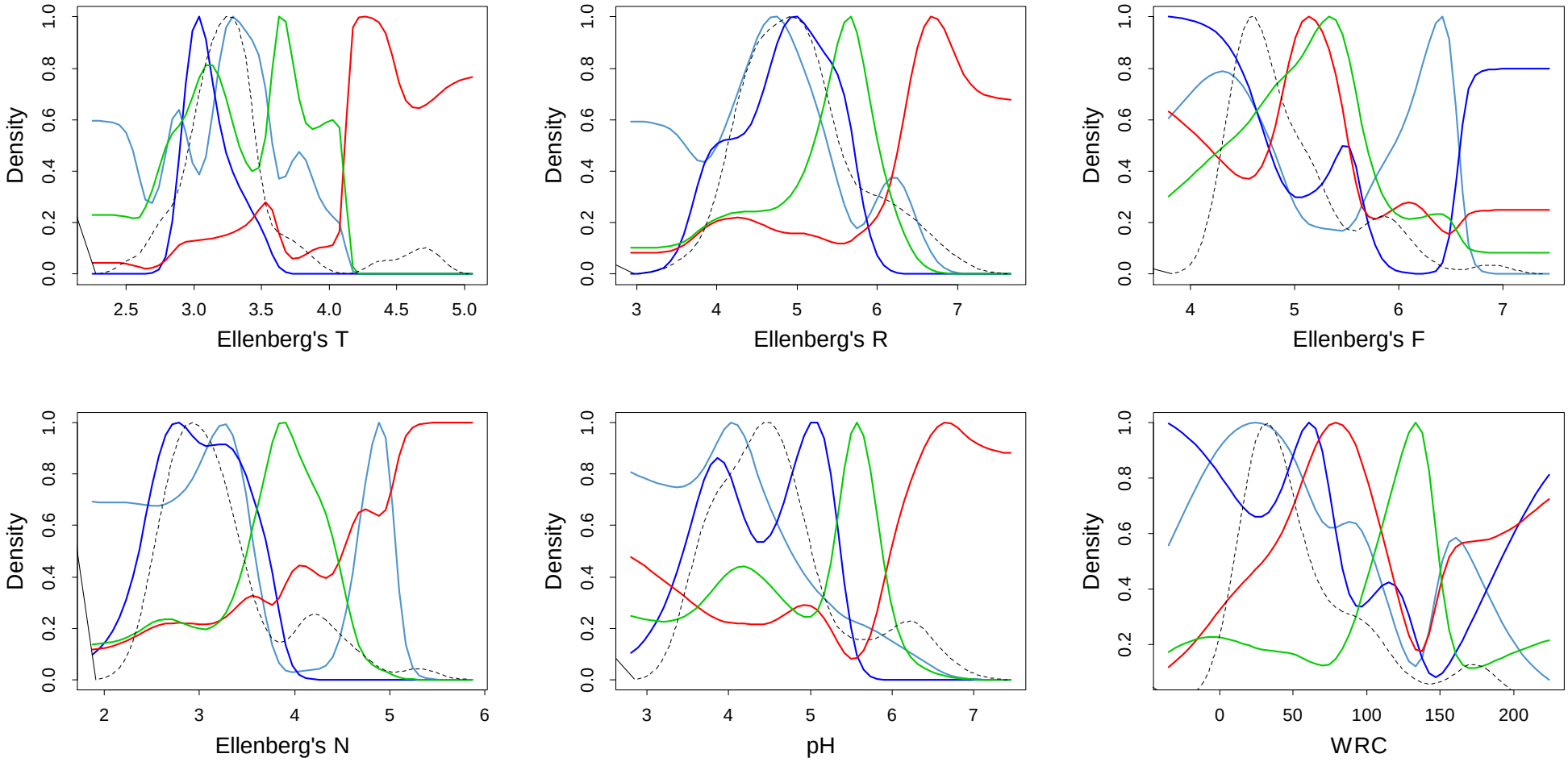

Figure S4 Smoothed density of species abundances along four environmental gradients as calculated from 58 sampling plots taken at the Rhône Glacier forefield plus 92 additional samples (46 containing *S. helvetica* and 46 containing *S. purpurea*) randomly selected from the Austrian vegetation database. Ellenberg's T, R, F and N values are indicator values of temperature, pH, soil moisture and nutrient availability as computed from the accompanying vegetation. The curves represent densities of *S. helvetica* (green), *S. purpurea* (red), F_1 hybrids (dark blue) and later generation hybrids (steel-blue). The dashed curve represents the density of the respective environmental variable.