Nordic Journal of Botany

**NJB-01747**

Hedrén, M. and Nordström Olofsson, S. 2018. High levels of genetic diversity in marginal populations of the marsh orchid *Dactylorhiza majalis* ssp. *Majalis*. – Nordic Journal of Botany doi: 10.1111/njb.01747

# Appendix 1−4

Appendix 1. Summary of nuclear microsatellite allele frequencies, plastid haplotype compositions and ITS allele frequencies in population samples of *D. majalis* ssp. *majalis*. N reports numbers of samples examined for each marker. ---: marker not found in the population sample. Plastid haplotypes are reported as direct counts.

Appendix 2. Diversity and richness statistics for the sampled populations of *D. majalis* ssp. *majalis*. The contribution by each population to the total has been subdivided into differentiation and diversity components for diversity and richness estimates, respectively, by the computer program CONTRIB 1.02 (Petit et al. 1998). T-tests were performed to compare the Continental and Scandinavian groups of populations for significant differences.

Appendix 3. Inbreeding coefficients within sampled populations and loci analyzed in *D. majalis* ssp. *majalis*. Significance levels: * $p<0.05$; ** $p<0.01$. --- : locus invariant.

Appendix 4. Differentiation between pairs of population calculated as pairwise $F_{ST}$, pairwise Jost´s $D$, and pairwise $G_{ST}$. Significance levels: ns = not significant; * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

# Appendix 1

| Locus/data category | ms3 | | | | | | | | ms8 | | | | | | | | ms11 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alleles/haplotypes | 144 | 153 | 156 | 159 | 162 | 165 | 168 | n | 191 | 194 | 197 | 200 | 203 | 206 | 209 | n | 156 | 159 | 162 | n |
| Site | | | | | | | | | | | | | | | | | | | | |
| 01_Oudelande_Zeedijk | --- | --- | .06 | --- | .67 | .28 | --- | 9 | --- | .05 | --- | --- | --- | .95 | --- | 10 | --- | .35 | .65 | 10 |
| 02_Steinachtal_Ostenwald | --- | --- | --- | 1.00 | --- | --- | --- | 11 | .18 | .09 | .05 | .05 | .32 | .27 | .05 | 11 | --- | 1.00 | --- | 11 |
| 03_Nunkirche | .06 | .22 | --- | --- | .72 | --- | --- | 9 | .10 | .10 | --- | --- | --- | .80 | --- | 10 | --- | 1.00 | --- | 10 |
| 04_Over | --- | .20 | --- | --- | .80 | --- | --- | 10 | .08 | .12 | --- | --- | .08 | .73 | --- | 13 | .23 | .62 | .15 | 13 |
| 05_Nedasov_Zlín | --- | .35 | --- | .05 | .60 | --- | --- | 10 | .15 | --- | .10 | .10 | .05 | .55 | .05 | 10 | .45 | .45 | .10 | 10 |
| 06_Pogore_Wi?nichie | --- | .15 | --- | --- | .85 | --- | --- | 10 | .10 | .15 | --- | .10 | .30 | .35 | --- | 10 | .10 | .65 | .25 | 10 |
| 07_Lubiana | --- | .23 | --- | .15 | .62 | --- | --- | 13 | --- | .04 | --- | .08 | .23 | .65 | --- | 13 | .19 | .81 | --- | 13 |
| 08_Pry?niewo | --- | .08 | --- | .17 | .67 | --- | .08 | 6 | .08 | --- | .08 | .17 | --- | .67 | --- | 6 | --- | 1.00 | --- | 6 |
| 09_Hunneröds_mosse | --- | .05 | --- | --- | .95 | --- | --- | 10 | --- | --- | --- | --- | .05 | .60 | .35 | 10 | .55 | .45 | --- | 10 |
| 10_Getaklöv | --- | .42 | --- | .17 | .25 | .17 | --- | 6 | --- | --- | --- | .17 | .58 | .08 | .17 | 6 | .58 | .42 | --- | 6 |
| 11_Högestads_mosse | --- | .05 | .05 | --- | .90 | --- | --- | 10 | .30 | .10 | --- | .15 | .05 | .40 | --- | 10 | .30 | .60 | .10 | 10 |
| 12_Örups_kärr | --- | --- | --- | --- | 1.00 | --- | --- | 10 | --- | --- | --- | --- | --- | 1.00 | --- | 10 | --- | 1.00 | --- | 10 |
| 13_Eskeröd | --- | .23 | --- | .23 | .55 | --- | --- | 11 | --- | --- | --- | --- | --- | 1.00 | --- | 11 | --- | .95 | .05 | 11 |
| 14_Lyngsjö | --- | .35 | --- | --- | .65 | --- | --- | 10 | --- | --- | --- | --- | --- | 1.00 | --- | 10 | --- | .83 | .17 | 9 |
| 15_Saxtorp | --- | .03 | --- | --- | .97 | --- | --- | 39 | --- | --- | .01 | --- | .01 | .96 | .01 | 39 | --- | .96 | .04 | 39 |
| 16_Nyhamn | --- | .25 | --- | --- | .75 | --- | --- | 6 | .07 | --- | --- | --- | .07 | .86 | v | 7 | --- | 1.00 | --- | 7 |
| 17_Vattenmöllan | --- | --- | --- | --- | 1.00 | --- | --- | 24 | .06 | .02 | .04 | .06 | .29 | .52 | .00 | 24 | --- | 1.00 | --- | 24 |
| 18_Kuggeboda | --- | --- | --- | --- | 1.00 | --- | --- | 9 | .60 | --- | --- | --- | --- | .40 | .00 | 10 | --- | .40 | .60 | 10 |
| Mean | .00 | .12 | .00 | .08 | .77 | .02 | .00 | 213 | .08 | .03 | .02 | .04 | .11 | .70 | .03 | 220 | .11 | .79 | .10 | 219 |

| Locus/data category | ms13 | | | | | | | | ms14 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alleles/haplotypes | 83 | 86 | 89 | 92 | 95 | 98 | 101 | n | 275 | 278 | 287 | 290 | 293 | 296 | n |
| Site | | | | | | | | | | | | | | | |
| 01_Oudelande_Zeedijk | .56 | .06 | .19 | .19 | --- | --- | --- | 8 | --- | --- | --- | 1.00 | --- | --- | 9 |
| 02_Steinachtal_Ostenwald | --- | --- | .14 | .45 | .05 | --- | .36 | 11 | --- | --- | .50 | .50 | --- | --- | 11 |
| 03_Nunkirche | --- | --- | .40 | .45 | --- | --- | .15 | 10 | --- | .10 | .60 | .15 | .10 | .05 | 10 |
| 04_Over | --- | --- | .04 | .88 | --- | --- | .08 | 12 | --- | --- | .81 | .19 | --- | --- | 13 |
| 05_Nedasov_Zlín | --- | --- | .50 | .40 | --- | --- | .10 | 10 | --- | --- | .90 | .05 | .05 | --- | 10 |
| 06_Pogore_Wi?nichie | .05 | .05 | .25 | .50 | --- | --- | .15 | 10 | --- | .10 | .40 | .40 | .10 | --- | 10 |
| 07_Lubiana | .04 | .08 | .31 | .46 | --- | .04 | .08 | 13 | --- | --- | .62 | .38 | --- | --- | 13 |
| 08_Pry?niewo | --- | --- | .17 | .83 | --- | --- | --- | 6 | --- | .17 | --- | .83 | --- | --- | 6 |
| 09_Hunneröds_mosse | --- | --- | .55 | .15 | --- | --- | .30 | 10 | .30 | --- | .70 | --- | --- | --- | 10 |
| 10_Getaklöv | --- | --- | .25 | .75 | --- | --- | --- | 6 | --- | --- | .83 | .17 | --- | --- | 6 |
| 11_Högestads_mosse | --- | .25 | .50 | .25 | --- | --- | --- | 10 | --- | .05 | .45 | .45 | .05 | --- | 10 |
| 12_Örups_kärr | --- | --- | .28 | .67 | --- | --- | .06 | 9 | .45 | --- | .30 | .25 | --- | --- | 10 |
| 13_Eskeröd | --- | --- | .25 | .70 | --- | --- | .05 | 10 | --- | --- | .45 | .55 | --- | --- | 11 |
| 14_Lyngsjö | --- | --- | .50 | .50 | --- | --- | --- | 7 | --- | --- | .69 | .31 | --- | --- | 8 |
| 15_Saxtorp | .42 | --- | .25 | .30 | --- | .03 | --- | 38 | --- | --- | .71 | .28 | .01 | --- | 39 |
| 16_Nyhamn | --- | --- | .50 | .50 | --- | --- | --- | 6 | --- | --- | .50 | .36 | --- | .14 | 7 |
| 17_Vattenmöllan | --- | --- | .56 | .44 | --- | --- | --- | 24 | --- | --- | 1.00 | --- | --- | --- | 24 |
| 18_Kuggeboda | --- | --- | .50 | .50 | --- | --- | --- | 9 | --- | --- | .11 | .56 | .33 | --- | 9 |
| Mean | .10 | .02 | .34 | .46 | .00 | .01 | .07 | 209 | .03 | .02 | .60 | .31 | .03 | .01 | 216 |

| Locus/data category | Plastid haplotypes; direct counts | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alleles/haplotypes | 21 | 41 | 44 | 53 | 59 | 80 | 87 | 93 | 95 | 167 | 318 | 319 | 361 |
| Site | | | | | | | | | | | | | |
| 01_Oudelande_Zeedijk | | | | | 7 | | 1 | | 1 | | | | |
| 02_Steinachtal_Ostenwald | | | 1 | | | 1 | 9 | | | | | | |
| 03_Nunkirche | | | | | | | 2 | 1 | 7 | | | | |
| 04_Over | | 1 | | | 1 | | 1 | | 5 | | | 5 | |
| 05_Nedasov_Zlín | | | 5 | | | | 1 | | 4 | | | | |
| 06_Pogore_Wi?nichie | 2 | | | | | | 2 | 1 | 3 | | | | |
| 07_Lubiana | | | | 1 | | | 11 | 1 | | | | | |
| 08_Pry?niewo | | | | | | | 4 | | 1 | | 1 | | |
| 09_Hunneröds_mosse | | | | | | | | 9 | | 1 | | | |
| 10_Getaklöv | | | | | | | 1 | | 5 | | | | |
| 11_Högestads_mosse | | | | | | | 4 | | 6 | | | | |
| 12_Örups_kärr | | | | | | | 8 | | 2 | | | | |
| 13_Eskeröd | | | | | | | 9 | | 1 | | | | 1 |
| 14_Lyngsjö | | | | | | | 1 | 9 | | | | | |
| 15_Saxtorp | | | 31 | | | | | | 8 | | | | |
| 16_Nyhamn | 1 | | | | | | 6 | | | | | | |
| 17_Vattenmöllan | | | | | | | | 24 | | | | | |
| 18_Kuggeboda | | | | | | | 10 | | | | | | |
| Mean | | | | | | | | | | | | | |

| Locus/data category | ITS allele frequencies | | | | |
|---|---|---|---|---|---|
| Alleles/haplotypes | IIIa | IV | V | VI | X |
| Site | | | | | |
| 01_Oudelande_Zeedijk | .79 | --- | .06 | --- | .16 |
| 02_Steinachtal_Ostenwald | .86 | --- | .14 | --- | --- |
| 03_Nunkirche | .93 | --- | .06 | --- | .01 |
| 04_Over | .96 | --- | .02 | --- | .02 |
| 05_Nedasov_Zlín | .91 | --- | .09 | --- | --- |
| 06_Pogore_Wi?nichie | .94 | --- | .06 | --- | --- |
| 07_Lubiana | .87 | --- | .13 | --- | --- |
| 08_Pry?niewo | .93 | --- | .07 | --- | --- |
| 09_Hunneröds_mosse | .91 | --- | .05 | --- | .04 |
| 10_Getaklöv | .99 | --- | .01 | --- | --- |
| 11_Högestads_mosse | .98 | --- | .02 | --- | --- |
| 12_Örups_kärr | .94 | .01 | .05 | --- | --- |
| 13_Eskeröd | .93 | --- | .07 | --- | --- |
| 14_Lyngsjö | .92 | --- | .08 | --- | --- |
| 15_Saxtorp | .96 | --- | .04 | --- | --- |
| 16_Nyhamn | 1.00 | --- | --- | --- | --- |
| 17_Vattenmöllan | 1.00 | --- | --- | --- | --- |
| 18_Kuggeboda | .87 | --- | .05 | --- | .08 |
| Mean | | | | | |

# Appendix 2

Diversity and richness statistics for the sampled populations of *D. majalis* ssp. *majalis* . nr: nuclear data; pd: plastid data

| | From Table 3 | | | | | | Contribution by population to overall diversity. H statistics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diversity | | | Richness | | | Total contribution Ct | | | Differentiation component Cs | | | Diversity component Cd | | |
| | nr | pd | corr | nr | pd | corr | nr | pd | corr | nr | pd | corr | nr | pd | corr |
| 01_Oudelande_Zeedijk | 0.29 | 0.42 | 0.40 | 0.89 | 1.33 | 0.55 | 2.0% | 2.4% | -0.03 | -0.6% | 0.2% | 0.43 | 2.5% | 2.2% | 0.27 |
| 02_Steinachtal_Ostenwald | 0.40 | 0.35 | | 1.14 | 1.09 | | 2.8% | -1.4% | | 0.0% | -0.3% | | 2.8% | -1.1% | |
| 03_Nunkirche | 0.41 | 0.51 | | 1.18 | 1.47 | | -1.0% | -0.2% | | 0.1% | 0.9% | | -1.1% | -1.1% | |
| 04_Over | 0.45 | 0.74 | | 1.03 | 2.35 | | -0.9% | 1.7% | | -0.3% | 2.7% | | -0.6% | -1.0% | |
| 05_Nedasov_Zlín | 0.53 | 0.64 | | 1.43 | 1.60 | | 1.0% | 1.2% | | 1.4% | 2.0% | | -0.4% | -0.8% | |
| 06_Pogore_Wi?nichie | 0.60 | 0.82 | | 1.76 | 2.68 | | 0.9% | 0.3% | | 2.1% | 3.3% | | -1.2% | -3.0% | |
| 07_Lubiana | 0.52 | 0.30 | | 1.38 | 0.92 | | -0.2% | -1.7% | | 1.3% | -0.7% | | -1.5% | -1.0% | |
| 08_Pry?niewo | 0.35 | 0.60 | | 1.02 | 2.00 | | -0.4% | -1.1% | | -0.7% | 1.6% | | 0.3% | -2.7% | |
| 09_Hunneröds_mosse | 0.44 | 0.20 | | 1.01 | 0.60 | | 1.0% | 1.8% | | 0.4% | -1.4% | | 0.5% | 3.2% | |
| 10_Getaklöv | 0.53 | 0.33 | | 1.43 | 1.00 | | 3.1% | 0.0% | | 1.4% | -0.4% | | 1.6% | 0.4% | |
| 11_Högestads_mosse | 0.56 | 0.53 | | 1.55 | 1.00 | | 0.9% | -0.9% | | 1.7% | 1.1% | | -0.8% | -2.0% | |
| 12_Örups_kärr | 0.17 | 0.36 | | 0.60 | 0.87 | | -1.9% | -1.9% | | -1.9% | -0.2% | | -0.1% | -1.7% | |
| 13_Eskeröd | 0.31 | 0.35 | | 0.82 | 1.09 | | -1.4% | -1.7% | | -0.7% | -0.3% | | -0.7% | -1.3% | |
| 14_Lyngsjö | 0.23 | 0.20 | | 0.72 | 0.60 | | -1.5% | 1.1% | | -0.6% | -1.4% | | -1.0% | 2.5% | |
| 15_Saxtorp | 0.25 | 0.34 | | 0.68 | 0.77 | | -2.0% | 2.5% | | -1.6% | -0.4% | | -0.4% | 2.9% | |
| 16_Nyhamn | 0.31 | 0.29 | | 0.75 | 0.86 | | -1.9% | -1.5% | | -0.6% | -0.8% | | -1.3% | -0.8% | |
| 17_Vattenmöllan | 0.23 | 0.00 | | 0.58 | 0.00 | | -1.8% | 1.7% | | -2.0% | -2.9% | | 0.1% | 4.6% | |
| 18_Kuggeboda | 0.51 | 0.00 | | 0.89 | 0.00 | | 1.4% | -2.2% | | 0.3% | -2.9% | | 1.2% | 0.7% | |
| Mean | | | | 1.05 | 1.12 | | 0.0% | 0.0% | | 0.0% | 0.0% | | 0.0% | 0.0% | |
| | | | | | | | | | | | | | | | |
| Mean Europe | 0.44 | 0.55 | | 1.23 | 1.68 | | 0.5% | 0.2% | | 0.4% | 1.2% | | 0.1% | -1.1% | |
| Mean Scandinavia | 0.35 | 0.26 | | 0.90 | 0.68 | | -0.4% | -0.1% | | -0.3% | -1.0% | | -0.1% | 0.9% | |
| | | | | | | | | | | | | | | | |
| ttest Europe vs Scandinavia (p values) | 0.148 | 0.004 | | 0.040 | 0.002 | | 0.228 | 0.741 | | 0.177 | 0.004 | | 0.796 | 0.055 | |

| | Contribution by population to overall richness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total contribution | | | Differentiation component | | | Diversity component | | |
| | Crt | | | Crs | | | Crd | | |
| | nr | pd | corr | nr | pd | corr | nr | pd | corr |
| 01_Oudelande_Zeedijk | -5.2% | 10.8% | -0.05 | -0.6% | 0.5% | 0.56 | -4.5% | 10.3% | 0.25 |
| 02_Steinachtal_Ostenwald | -4.3% | 3.8% | | 0.1% | -0.1% | | -4.4% | 3.9% | |
| 03_Nunkirche | -8.6% | 4.6% | | 0.5% | 0.8% | | -9.1% | 3.8% | |
| 04_Over | -9.2% | 9.6% | | 0.1% | 2.7% | | -9.3% | 6.9% | |
| 05_Nedasov_Zlín | -6.8% | 7.3% | | 1.7% | 1.0% | | -8.6% | 6.3% | |
| 06_Pogore_Wi?nichie | -6.7% | 6.1% | | 3.0% | 3.4% | | -9.8% | 2.6% | |
| 07_Lubiana | -8.1% | 3.3% | | 1.4% | -0.4% | | -9.6% | 3.7% | |
| 08_Pry?niewo | -8.5% | 4.6% | | -0.1% | 1.9% | | -8.4% | 2.6% | |
| 09_Hunneröds_mosse | -6.4% | 7.4% | | -0.2% | -1.2% | | -6.3% | 8.5% | |
| 10_Getaklöv | -4.8% | 4.6% | | 1.9% | -0.3% | | -6.7% | 4.9% | |
| 11_Högestads_mosse | -6.4% | 4.0% | | 2.2% | -0.3% | | -8.6% | 4.3% | |
| 12_Örups_kärr | -9.8% | 2.8% | | -2.0% | -0.6% | | -7.8% | 3.4% | |
| 13_Eskeröd | -10.2% | 3.4% | | -0.9% | -0.1% | | -9.3% | 3.4% | |
| 14_Lyngsjö | -10.3% | 6.4% | | -1.3% | -1.2% | | -9.1% | 7.5% | |
| 15_Saxtorp | -10.6% | 9.6% | | -1.7% | -0.8% | | -8.9% | 10.3% | |
| 16_Nyhamn | -10.7% | 4.2% | | -1.3% | -0.6% | | -9.4% | 4.8% | |
| 17_Vattenmöllan | -10.4% | 7.2% | | -2.2% | -2.5% | | -8.2% | 9.7% | |
| 18_Kuggeboda | -6.2% | 2.2% | | -0.7% | -2.5% | | -5.6% | 4.7% | |
| Mean | -8.0% | 5.7% | | 0.0% | 0.0% | | -8.0% | 5.6% | |
| | | | | | | | | | |
| Mean Europe | -7.2% | 6.3% | | 0.8% | 1.2% | | -8.0% | 5.0% | |
| Mean Scandinavia | -8.6% | 5.2% | | -0.6% | -1.0% | | -8.0% | 6.2% | |
| | | | | | | | | | |
| ttest Europe vs Scandinavia (p values) | 0.163 | 0.393 | | 0.045 | 0.002 | | 0.987 | 0.377 | |

# Appendix 3

Inbreeding coefficients within sampled populations and loci analyzed in *D. majalis* ssp. *majalis*. Significance levels: * p<0.05; ** p<0.01. --- : locus invariant.

| Site | Locus | | | | | mean over loci |
|---|---|---|---|---|---|---|
| | ms3 | ms8 | ms11 | ms13 | ms14 | |
| | | | | | | |
| Continental Europe | | | | | | |
| 1. Oudelande Zeedijk | 0.12 | 0.00 | -0.05 | 0.04 | --- | 0.04 |
| 2. Steinachtal/Ostenwald | --- | -0.12 | --- | -0.23* | 0.14 | -0.09 |
| 3. Nunkirche | 0.27 | -0.12 | --- | 0.55* | 0.53** | 0.37 |
| 4. Over | -0.20 | 0.17 | 0.05 | -0.06 | 0.77* | 0.16 |
| 5. Nedašov/Zlín | -0.11 | 0.13 | 0.20 | 0.02 | -0.03 | 0.06 |
| 6. Pogore Wiśnichie | -0.12 | -0.16 | -0.34 | -0.16 | 0.14 | -0.12 |
| 7. Lubiana | 0.19 | -0.32 | 0.77* | -0.21 | 0.38 | 0.09 |
| 8. Pryśniewo | 0.43 | 0.12 | --- | -0.11 | 1.00** | 0.35 |
| | | | | | | |
| Scandinavia | | | | | | |
| 9. Hunneröds mosse | 0.00 | 0.64 | -0.80* | 0.53** | 1.00 | 0.34 |
| 10. Getaklöv | -0.09 | 0.25 | 0.06 | -0.25 | -0.11 | 0.00 |
| 11. Högestads mosse | -0.03 | 0.48* | 0.31 | 0.56* | 0.69** | 0.48 |
| 12. Örups kärr | --- | --- | --- | 0.12 | 0.72** | 0.48 |
| 13. Eskeröd | -0.01 | --- | -0.00 | 0.15 | 0.31 | 0.13 |
| 14. Lyngsjö | -0.50 | --- | -0.14 | -0.36 | 0.74 | -0.08 |
| 15. Saxtorp | -0.01 | -0.01 | -0.03 | 0.15 | 0.34* | 0.19 |
| 16. Nyhamn | -0.25 | -0.04 | --- | 0.41 | 0.36 | 0.19 |
| 17. Vattenmöllan | --- | 0.10 | --- | 0.59** | --- | 0.32 |
| 18. Kuggeboda | --- | 0.22 | 0.22 | -0.05 | 0.46 | 0.22 |
| | | | | | | |
| mean over populations | -0.01 | 0.09 | 0.03 | 0.15 | 0.46 | |

Appendix 4. Differentiation between pairs of population calculated as pairwise Jost´s *D*, pairwise $F_{ST}$, and pairwise $G_{ST}$. Significance levels: ns = not significant; * p<0.05; ** p<0.01; *** p<0.001.

Pairwise D

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** |
| 2 | 0.609 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** |
| 3 | 0.379 | 0.342 | 0.000 | ** | * | * | ns | ** | *** | *** | * | * | ns | ns | ** | ns | ** | *** |
| 4 | 0.396 | 0.407 | 0.066 | 0.000 | ** | ** | * | *** | *** | ** | *** | *** | ** | ** | *** | ** | *** | *** |
| 5 | 0.514 | 0.452 | 0.094 | 0.084 | 0.000 | ** | * | *** | * | ** | * | *** | *** | ** | *** | ** | *** | *** |
| 6 | 0.296 | 0.369 | 0.077 | 0.086 | 0.142 | 0.000 | ns | ** | *** | *** | ns | *** | *** | ** | *** | * | *** | ** |
| 7 | 0.335 | 0.255 | 0.009 | 0.053 | 0.065 | 0.031 | 0.000 | * | *** | ** | ns | ** | ns | ns | *** | ns | *** | *** |
| 8 | 0.246 | 0.296 | 0.137 | 0.187 | 0.370 | 0.127 | 0.115 | 0.000 | *** | ** | * | ** | ns | ** | *** | * | *** | ** |
| 9 | 0.503 | 0.565 | 0.152 | 0.187 | 0.063 | 0.195 | 0.154 | 0.427 | 0.000 | *** | * | *** | *** | *** | *** | *** | *** | *** |
| 10 | 0.718 | 0.371 | 0.339 | 0.205 | 0.128 | 0.241 | 0.180 | 0.447 | 0.314 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** |
| 11 | 0.307 | 0.445 | 0.089 | 0.154 | 0.091 | 0.011 | 0.054 | 0.174 | 0.112 | 0.314 | 0.000 | *** | ** | ** | *** | ns | *** | * |
| 12 | 0.322 | 0.438 | 0.052 | 0.114 | 0.252 | 0.149 | 0.104 | 0.104 | 0.199 | 0.475 | 0.171 | 0.000 | ** | ** | *** | ns | *** | *** |
| 13 | 0.267 | 0.260 | 0.034 | 0.085 | 0.201 | 0.137 | 0.030 | 0.041 | 0.291 | 0.358 | 0.177 | 0.063 | 0.000 | ns | *** | ns | *** | *** |
| 14 | 0.299 | 0.391 | -0.003 | 0.070 | 0.091 | 0.124 | 0.023 | 0.158 | 0.183 | 0.333 | 0.126 | 0.079 | 0.021 | 0.000 | ** | ns | *** | *** |
| 15 | 0.268 | 0.434 | 0.047 | 0.118 | 0.189 | 0.153 | 0.082 | 0.198 | 0.189 | 0.450 | 0.153 | 0.078 | 0.093 | 0.060 | 0.000 | ** | *** | *** |
| 16 | 0.306 | 0.347 | -0.032 | 0.081 | 0.120 | 0.076 | -0.002 | 0.083 | 0.178 | 0.338 | 0.071 | 0.037 | 0.006 | -0.015 | 0.045 | 0.000 | ** | *** |
| 17 | 0.522 | 0.407 | 0.060 | 0.121 | 0.121 | 0.138 | 0.092 | 0.297 | 0.152 | 0.294 | 0.138 | 0.144 | 0.180 | 0.099 | 0.092 | 0.074 | 0.000 | *** |
| 18 | 0.239 | 0.573 | 0.260 | 0.278 | 0.326 | 0.124 | 0.282 | 0.224 | 0.354 | 0.560 | 0.100 | 0.262 | 0.286 | 0.264 | 0.303 | 0.227 | 0.326 | 0.000 |

Pairwise FST

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** |
| 2 | 0.360 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** |
| 3 | 0.263 | 0.223 | 0.000 | ** | * | * | ns | ** | *** | *** | * | * | ns | ns | ** | ns | ** | *** |
| 4 | 0.280 | 0.260 | 0.076 | 0.000 | ** | ** | * | *** | *** | ** | *** | *** | ** | ** | *** | ** | *** | *** |
| 5 | 0.273 | 0.229 | 0.080 | 0.073 | 0.000 | ** | * | *** | * | ** | * | *** | *** | ** | *** | ** | *** | *** |
| 6 | 0.168 | 0.179 | 0.064 | 0.066 | 0.077 | 0.000 | ns | ** | *** | *** | ns | *** | *** | ** | *** | * | *** | ** |
| 7 | 0.202 | 0.150 | 0.033 | 0.053 | 0.052 | 0.034 | 0.000 | * | *** | ** | ns | *** | ns | ns | *** | ns | *** | *** |
| 8 | 0.227 | 0.232 | 0.143 | 0.176 | 0.227 | 0.102 | 0.105 | 0.000 | *** | ** | * | ** | ns | ** | *** | * | *** | ** |
| 9 | 0.304 | 0.302 | 0.124 | 0.144 | 0.062 | 0.110 | 0.102 | 0.282 | 0.000 | *** | * | *** | *** | *** | *** | *** | *** | *** |
| 10 | 0.347 | 0.207 | 0.195 | 0.141 | 0.089 | 0.118 | 0.107 | 0.265 | 0.178 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** |
| 11 | 0.187 | 0.220 | 0.080 | 0.109 | 0.068 | 0.034 | 0.051 | 0.139 | 0.087 | 0.154 | 0.000 | *** | ** | ** | *** | ns | *** | * |
| 12 | 0.308 | 0.341 | 0.086 | 0.140 | 0.196 | 0.122 | 0.105 | 0.157 | 0.193 | 0.311 | 0.149 | 0.000 | ** | ** | *** | ns | *** | *** |
| 13 | 0.229 | 0.203 | 0.058 | 0.094 | 0.141 | 0.096 | 0.043 | 0.079 | 0.211 | 0.221 | 0.128 | 0.103 | 0.000 | ns | *** | ns | *** | *** |
| 14 | 0.245 | 0.268 | 0.031 | 0.082 | 0.082 | 0.090 | 0.040 | 0.168 | 0.151 | 0.209 | 0.103 | 0.117 | 0.046 | 0.000 | ** | ns | *** | *** |
| 15 | 0.253 | 0.319 | 0.064 | 0.125 | 0.144 | 0.109 | 0.074 | 0.213 | 0.167 | 0.282 | 0.120 | 0.125 | 0.114 | 0.082 | 0.000 | * | *** | *** |
| 16 | 0.248 | 0.245 | 0.019 | 0.096 | 0.103 | 0.071 | 0.032 | 0.119 | 0.152 | 0.211 | 0.082 | 0.082 | 0.042 | 0.024 | 0.072 | 0.000 | ** | *** |
| 17 | 0.410 | 0.323 | 0.083 | 0.138 | 0.111 | 0.108 | 0.088 | 0.299 | 0.152 | 0.223 | 0.120 | 0.213 | 0.203 | 0.129 | 0.134 | 0.109 | 0.000 | *** |
| 18 | 0.188 | 0.311 | 0.181 | 0.194 | 0.178 | 0.083 | 0.159 | 0.190 | 0.215 | 0.267 | 0.084 | 0.238 | 0.213 | 0.200 | 0.242 | 0.181 | 0.270 | 0.000 |

Pairwise GST

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** |
| 2 | 0.338 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** |
| 3 | 0.232 | 0.196 | 0.000 | ** | * | * | ns | ** | *** | *** | * | * | ns | ns | ** | ns | ** | *** |
| 4 | 0.255 | 0.239 | 0.046 | 0.000 | ** | ** | * | *** | *** | ** | *** | *** | ** | ** | *** | ** | *** | *** |
| 5 | 0.247 | 0.206 | 0.049 | 0.047 | 0.000 | ** | * | *** | * | ** | * | *** | *** | ** | *** | ** | *** | *** |
| 6 | 0.144 | 0.158 | 0.036 | 0.043 | 0.053 | 0.000 | ns | ** | *** | *** | ns | *** | *** | ** | *** | * | *** | ** |
| 7 | 0.178 | 0.129 | 0.005 | 0.031 | 0.028 | 0.012 | 0.000 | * | *** | ** | ns | *** | ns | ns | *** | ns | *** | *** |
| 8 | 0.185 | 0.196 | 0.096 | 0.137 | 0.188 | 0.066 | 0.068 | 0.000 | *** | ** | * | ** | ns | ** | *** | * | *** | ** |
| 9 | 0.274 | 0.276 | 0.089 | 0.115 | 0.031 | 0.082 | 0.075 | 0.238 | 0.000 | *** | * | *** | *** | *** | *** | *** | *** | *** |
| 10 | 0.315 | 0.176 | 0.155 | 0.108 | 0.053 | 0.086 | 0.074 | 0.218 | 0.139 | 0.000 | *** | *** | *** | *** | *** | *** | *** | *** |
| 11 | 0.152 | 0.19 | 0.043 | 0.077 | 0.036 | 0.004 | 0.022 | 0.090 | 0.051 | 0.111 | 0.000 | *** | ** | ** | *** | ns | *** | * |
| 12 | 0.278 | 0.316 | 0.049 | 0.110 | 0.167 | 0.095 | 0.077 | 0.109 | 0.157 | 0.274 | 0.111 | 0.000 | ** | ** | *** | ns | *** | *** |
| 13 | 0.202 | 0.18 | 0.026 | 0.069 | 0.115 | 0.072 | 0.019 | 0.037 | 0.181 | 0.188 | 0.095 | 0.071 | 0.000 | ns | *** | ns | *** | *** |
| 14 | 0.218 | 0.245 | -0.002 | 0.056 | 0.054 | 0.065 | 0.015 | 0.127 | 0.120 | 0.175 | 0.068 | 0.085 | 0.019 | 0.000 | ** | ns | *** | *** |
| 15 | 0.235 | 0.305 | 0.043 | 0.110 | 0.127 | 0.094 | 0.060 | 0.183 | 0.147 | 0.258 | 0.098 | 0.104 | 0.097 | 0.063 | 0.000 | * | *** | *** |
| 16 | 0.212 | 0.214 | -0.024 | 0.061 | 0.066 | 0.039 | -0.001 | 0.066 | 0.111 | 0.167 | 0.037 | 0.039 | 0.005 | -0.013 | 0.046 | 0.000 | ** | *** |
| 17 | 0.392 | 0.307 | 0.058 | 0.120 | 0.090 | 0.090 | 0.071 | 0.266 | 0.128 | 0.195 | 0.094 | 0.188 | 0.183 | 0.108 | 0.123 | 0.079 | 0.000 | *** |
| 18 | 0.158 | 0.286 | 0.147 | 0.167 | 0.149 | 0.056 | 0.133 | 0.146 | 0.182 | 0.230 | 0.047 | 0.204 | 0.184 | 0.170 | 0.223 | 0.141 | 0.248 | 0.000 |