**Table S4 Estimates of genetic and residual covariances and correlations (in the lower diagonal) based on individual NAM populations 11 – 20**

| | | LL | | | | | | | | LW | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Genetic covariance | | | | Residual covariance | | | | Genetic covariance | | | | Residual covariance | | | |
| PopId | Envi | E1 | E2 | E3 | E4 | E1 | E2 | E3 | E4 | E1 | E2 | E3 | E4 | E1 | E2 | E3 | E4 |
| 11 | E1 | 1477.8 | 995.6 | 1208.6 | 1038.0 | 5423.9 | 734.5 | 904.8 | 1294.2 | 22.7 | 13.8 | 18.2 | 20.7 | 93.7 | 2.8 | 5.3 | 4.0 |
| | E2 | 0.78 | 1090.6 | 880.4 | 956.9 | 0.22 | 2096.7 | 551.5 | 809.9 | 0.72 | 16.0 | 15.4 | 18.9 | 0.04 | 51.0 | 4.0 | 7.5 |
| | E3 | 0.84 | 0.71 | 1419.1 | 973.4 | 0.22 | 0.22 | 3096.9 | 978.2 | 0.89 | 0.90 | 18.4 | 19.8 | 0.07 | 0.07 | 63.3 | 5.0 |
| | E4 | 0.78 | 0.84 | 0.75 | 1196.9 | 0.22 | 0.22 | 0.22 | 6486.6 | 0.88 | 0.95 | 0.93 | 24.7 | 0.05 | 0.14 | 0.08 | 58.4 |
| 12 | E1 | 1842.3 | 1351.7 | 1272.0 | 1598.7 | 3464.1 | 907.2 | 1383.5 | 1123.5 | 35.2 | 24.6 | 20.7 | 24.2 | 81.4 | 12.4 | 23.4 | 17.8 |
| | E2 | 0.86 | 1330.3 | 1000.0 | 1460.9 | 0.37 | 1785.6 | 939.0 | 800.1 | 0.83 | 25.0 | 13.9 | 22.5 | 0.21 | 43.9 | 7.8 | 8.7 |
| | E3 | 0.85 | 0.78 | 1223.1 | 1194.3 | 0.37 | 0.35 | 3973.9 | 1185.4 | 0.95 | 0.76 | 13.5 | 14.9 | 0.24 | 0.11 | 117.8 | 17.6 |
| | E4 | 0.83 | 0.89 | 0.76 | 2015.1 | 0.36 | 0.36 | 0.35 | 2833.8 | 0.84 | 0.92 | 0.83 | 23.8 | 0.27 | 0.18 | 0.22 | 52.2 |
| 13 | E1 | 1157.0 | 820.0 | 1085.7 | 561.1 | 2534.7 | 1538.2 | 1589.9 | 2216.2 | 44.6 | 20.8 | 21.8 | 27.3 | 89.9 | 31.5 | 28.3 | 18.7 |
| | E2 | 0.79 | 926.8 | 1079.4 | 635.1 | 0.61 | 2482.2 | 1508.1 | 2118.0 | 0.72 | 18.7 | 12.5 | 22.4 | 0.43 | 59.0 | 32.6 | 17.3 |
| | E3 | 0.79 | 0.88 | 1618.3 | 638.2 | 0.58 | 0.56 | 2922.8 | 2239.8 | 0.89 | 0.78 | 13.6 | 17.1 | 0.32 | 0.45 | 88.0 | 23.9 |
| | E4 | 0.69 | 0.87 | 0.66 | 579.5 | 0.61 | 0.59 | 0.58 | 5145.9 | 0.87 | 1.00 | 0.98 | 22.3 | 0.22 | 0.25 | 0.29 | 79.5 |
| 14 | E1 | 1044.0 | 1056.3 | 541.5 | 712.2 | 3710.3 | 1648.1 | 1699.0 | 1545.3 | 21.6 | 17.1 | 13.6 | 19.1 | 60.6 | 21.4 | 16.2 | 22.6 |
| | E2 | 0.80 | 1660.8 | 665.6 | 973.8 | 0.51 | 2809.6 | 1441.5 | 1360.5 | 0.93 | 15.6 | 12.9 | 15.1 | 0.29 | 88.9 | 26.7 | 16.2 |
| | E3 | 0.68 | 0.66 | 607.9 | 521.3 | 0.50 | 0.48 | 3177.0 | 1443.4 | 0.80 | 0.89 | 13.5 | 15.1 | 0.22 | 0.30 | 86.7 | 20.1 |
| | E4 | 0.70 | 0.76 | 0.67 | 995.7 | 0.49 | 0.50 | 0.50 | 2680.9 | 0.98 | 0.92 | 0.98 | 17.5 | 0.42 | 0.25 | 0.31 | 48.3 |
| 15 | E1 | 1116.9 | 701.5 | 432.1 | 712.4 | 5458.0 | 1562.6 | 2514.5 | 2265.9 | 29.7 | 18.9 | 15.2 | 25.0 | 209.5 | 22.0 | 32.3 | 28.5 |
| | E2 | 0.76 | 761.6 | 505.7 | 723.7 | 0.49 | 1846.1 | 1451.3 | 1417.0 | 0.77 | 20.4 | 18.6 | 25.5 | 0.25 | 35.9 | 8.1 | 13.3 |
| | E3 | 0.52 | 0.73 | 626.9 | 613.2 | 0.49 | 0.48 | 4888.6 | 2165.8 | 0.54 | 0.80 | 26.4 | 30.3 | 0.24 | 0.14 | 89.1 | 22.6 |
| | E4 | 0.68 | 0.84 | 0.79 | 970.6 | 0.48 | 0.52 | 0.49 | 4079.6 | 0.77 | 0.94 | 0.99 | 35.7 | 0.24 | 0.27 | 0.29 | 70.4 |
| 16 | E1 | 750.8 | 418.4 | 556.6 | 387.0 | 3625.6 | 1213.3 | 1309.3 | 1502.7 | 36.9 | 27.9 | 25.6 | 35.2 | 121.8 | 8.3 | 7.3 | 8.4 |
| | E2 | 0.62 | 614.7 | 441.7 | 418.7 | 0.38 | 2802.1 | 1151.5 | 1343.1 | 0.79 | 33.9 | 22.5 | 31.9 | 0.10 | 54.0 | 7.4 | 6.4 |
| | E3 | 0.67 | 0.59 | 924.5 | 429.5 | 0.37 | 0.37 | 3396.9 | 1410.2 | 0.98 | 0.90 | 18.5 | 25.2 | 0.07 | 0.11 | 87.8 | 12.8 |
| | E4 | 0.67 | 0.80 | 0.67 | 451.7 | 0.38 | 0.39 | 0.37 | 4257.6 | 0.97 | 0.92 | 0.98 | 35.7 | 0.10 | 0.12 | 0.18 | 55.9 |
| 17 | E1 | 585.4 | 119.0 | 414.2 | 386.1 | 3786.1 | 1236.2 | 1156.0 | 1077.8 | 36.4 | 34.5 | 22.6 | 35.2 | 62.6 | 10.4 | 15.7 | 16.7 |
| | E2 | 0.34 | 210.5 | 136.6 | 285.0 | 0.30 | 4471.4 | 1226.4 | 1175.0 | 0.94 | 37.0 | 25.1 | 40.1 | 0.20 | 45.2 | 15.2 | 9.5 |
| | E3 | 0.75 | 0.41 | 526.9 | 499.8 | 0.30 | 0.29 | 3945.9 | 1067.2 | 0.83 | 0.91 | 20.5 | 27.6 | 0.21 | 0.24 | 85.8 | 25.2 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E4 | 0.59 | 0.73 | 0.81 | 720.8 | 0.31 | 0.31 | 0.30 | 3305.8 | 0.87 | 0.99 | 0.91 | 44.7 | 0.26 | 0.17 | 0.34 | 65.3 |
| 18 | E1 | 741.1 | 316.8 | 168.0 | 257.1 | 2964.9 | 994.9 | 1188.7 | 1167.9 | 26.1 | 15.7 | 8.8 | 9.5 | 82.3 | 5.9 | 5.5 | 7.0 |
| | E2 | 0.61 | 366.0 | 191.7 | 278.7 | 0.36 | 2524.1 | 1079.0 | 1068.2 | 0.93 | 11.0 | 9.2 | 7.3 | 0.08 | 64.3 | 8.2 | 5.6 |
| | E3 | 0.38 | 0.62 | 258.9 | 158.5 | 0.36 | 0.35 | 3702.0 | 1267.1 | 0.50 | 0.80 | 12.0 | 7.4 | 0.07 | 0.13 | 67.6 | 5.9 |
| | E4 | 0.40 | 0.62 | 0.42 | 559.8 | 0.36 | 0.36 | 0.35 | 3536.1 | 0.61 | 0.72 | 0.70 | 9.4 | 0.11 | 0.10 | 0.10 | 49.0 |
| 19 | E1 | 1183.4 | 691.2 | 1095.4 | 608.9 | 3515.3 | 1627.3 | 1454.4 | 1619.9 | 22.8 | 15.4 | 19.3 | 19.4 | 75.5 | 25.7 | 24.1 | 27.8 |
| | E2 | 0.56 | 1273.4 | 731.1 | 542.0 | 0.40 | 4657.2 | 1637.7 | 1863.9 | 0.77 | 17.4 | 14.3 | 16.4 | 0.34 | 77.7 | 19.3 | 16.4 |
| | E3 | 0.81 | 0.52 | 1566.3 | 827.9 | 0.39 | 0.38 | 3944.8 | 1744.0 | 0.88 | 0.74 | 21.3 | 19.4 | 0.31 | 0.25 | 78.5 | 17.2 |
| | E4 | 0.65 | 0.56 | 0.77 | 742.2 | 0.39 | 0.39 | 0.40 | 4893.3 | 0.89 | 0.86 | 0.92 | 20.8 | 0.44 | 0.25 | 0.26 | 53.8 |
| 20 | E1 | 1688.2 | 1084.4 | 752.9 | 981.9 | 2754.9 | 972.3 | 1250.2 | 1241.4 | 24.4 | 20.0 | 19.2 | 19.4 | 91.0 | 23.9 | 15.0 | 27.8 |
| | E2 | 0.80 | 1098.6 | 560.2 | 920.7 | 0.48 | 1508.4 | 942.4 | 912.0 | 0.97 | 17.5 | 15.3 | 20.9 | 0.36 | 49.8 | 22.8 | 19.3 |
| | E3 | 0.67 | 0.62 | 748.9 | 759.5 | 0.44 | 0.45 | 2875.9 | 1313.2 | 0.83 | 0.78 | 21.9 | 21.8 | 0.18 | 0.36 | 79.5 | 17.9 |
| | E4 | 0.63 | 0.73 | 0.73 | 1444.0 | 0.45 | 0.45 | 0.46 | 2789.6 | 0.78 | 0.99 | 0.92 | 25.6 | 0.40 | 0.38 | 0.28 | 52.7 |

Envi: environment