

**TABLE S1**  
**Proportion of outlier loci (*known haplotypes model*)**

| <i>S</i> | No. loci | $\tau$ | Neutral   |            |           |            |           |            | Selective Sweep |            |           |            |           |            |           |            |           |            |
|----------|----------|--------|-----------|------------|-----------|------------|-----------|------------|-----------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
|          |          |        | $m = 0$   |            | $m = 2$   |            | $m = 0$   |            | $m = 2$         |            | $m = 0$   |            | $m = 2$   |            |           |            |           |            |
|          |          |        | $a = 0.5$ | $a = 0.95$ | $a = 0.5$ | $a = 0.95$ | $a = 0.5$ | $a = 0.95$ | $a = 0.5$       | $a = 0.95$ | $a = 0.5$ | $a = 0.95$ | $a = 0.5$ | $a = 0.95$ |           |            |           |            |
| 1        | 25       | 0.25   | low 0.013 | high 0.039 | low 0.000 | high 0.004 | low 0.017 | high 0.004 | low 0.000       | high 0.000 | low 0.000 | high 0.050 | low 0.150 | high 0.000 | low 0.000 | high 0.000 |           |            |
|          |          | 0.50   | low 0.035 | high 0.017 | low 0.000 | high 0.000 | low 0.017 | high 0.017 | low 0.000       | high 0.000 | low 0.150 | high 0.000 | low 0.000 | high 0.050 | low 0.100 | high 0.000 | low 0.000 |            |
|          |          | 1.00   | low 0.030 | high 0.009 | low 0.000 | high 0.000 | low 0.013 | high 0.026 | low 0.000       | high 0.000 | low 0.050 | high 0.200 | low 0.050 | high 0.000 | low 0.000 | high 0.250 | low 0.000 | high 0.050 |
|          | 500      | 0.25   | low 0.017 | high 0.019 | low 0.001 | high 0.001 | low 0.011 | high 0.015 | low 0.000       | high 0.001 | low 0.036 | high 0.072 | low 0.000 | high 0.012 | low 0.020 | high 0.076 | low 0.000 | high 0.040 |
|          |          | 0.50   | low 0.022 | high 0.021 | low 0.004 | high 0.002 | low 0.013 | high 0.014 | low 0.001       | high 0.001 | low 0.052 | high 0.084 | low 0.012 | high 0.012 | low 0.028 | high 0.124 | low 0.004 | high 0.044 |
|          |          | 1.00   | low 0.029 | high 0.015 | low 0.009 | high 0.000 | low 0.013 | high 0.016 | low 0.000       | high 0.002 | low 0.036 | high 0.052 | low 0.008 | high 0.004 | low 0.072 | high 0.152 | low 0.000 | high 0.076 |
| 3        | 25       | 0.25   | low 0.013 | high 0.004 | low 0.000 | high 0.000 | low 0.009 | high 0.004 | low 0.000       | high 0.000 | low 0.010 | high 0.300 | low 0.000 | high 0.100 | low 0.000 | high 0.350 | low 0.000 | high 0.250 |
|          |          | 0.50   | low 0.030 | high 0.000 | low 0.000 | high 0.000 | low 0.009 | high 0.013 | low 0.000       | high 0.000 | low 0.050 | high 0.300 | low 0.000 | high 0.150 | low 0.000 | high 0.450 | low 0.000 | high 0.100 |
|          |          | 1.00   | low 0.026 | high 0.004 | low 0.000 | high 0.000 | low 0.000 | high 0.026 | low 0.000       | high 0.004 | low 0.150 | high 0.100 | low 0.000 | high 0.000 | low 0.100 | high 0.300 | low 0.050 | high 0.000 |
|          | 500      | 0.25   | low 0.011 | high 0.008 | low 0.000 | high 0.001 | low 0.009 | high 0.008 | low 0.000       | high 0.001 | low 0.032 | high 0.260 | low 0.000 | high 0.124 | low 0.052 | high 0.324 | low 0.000 | high 0.196 |
|          |          | 0.50   | low 0.017 | high 0.010 | low 0.002 | high 0.001 | low 0.009 | high 0.006 | low 0.002       | high 0.001 | low 0.032 | high 0.156 | low 0.000 | high 0.060 | low 0.048 | high 0.376 | low 0.000 | high 0.216 |
|          |          | 1.00   | low 0.029 | high 0.012 | low 0.009 | high 0.000 | low 0.009 | high 0.010 | low 0.001       | high 0.001 | low 0.016 | high 0.160 | low 0.004 | high 0.036 | low 0.060 | high 0.340 | low 0.008 | high 0.204 |
| 5        | 25       | 0.25   | low 0.000 | high 0.000 | low 0.000 | high 0.000 | low 0.000 | high 0.000 | low 0.000       | high 0.000 | low 0.000 | high 0.000 | low 0.000 | high 0.000 | low 0.000 | high 0.000 | low 0.000 | high 1.000 |
|          |          | 0.50   | low 0.004 | high 0.004 | low 0.000 | high 0.000 | low 0.000 | high 0.000 | low 0.000       | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 1.000 |
|          |          | 1.00   | low 0.030 | high 0.004 | low 0.000 | high 0.000 | low 0.000 | high 0.000 | low 0.000       | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 1.000 |
|          | 500      | 0.25   | low 0.003 | high 0.000 | low 0.000 | high 0.000 | low 0.000 | high 0.000 | low 0.000       | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 1.000 |
|          |          | 0.50   | low 0.010 | high 0.003 | low 0.002 | high 0.000 | low 0.000 | high 0.000 | low 0.000       | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 1.000 |
|          |          | 1.00   | low 0.030 | high 0.012 | low 0.010 | high 0.000 | low 0.000 | high 0.000 | low 0.000       | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 0.000 | low 0.000 | high 1.000 | low 0.000 | high 1.000 |

Mean proportion of neutrally evolving and selected loci over 10 replicates identified as outliers for the *known haplotypes model*.