Supplemental Material

Table S1 P-values for rejecting the null hypothesis that genotypes are in Hardy–Weinberg proportions. Adjusted alpha = 0.00455.

| | A17 | A19 | A21 | A32 | A42 | A90 | U21 | U32 | U41 | U43 | U55 | U74 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Red-and-green Macaw | - | 0.942 | 0.890 | 1.000 | 0.006 | 0.086 | 0.185 | 0.085 | 0.361 | 0.463 | 1.000 | 0.081 |
| Scarlet Macaw | 0.075 | 0.298 | 0.351 | 0.765 | <0.0001 | 0.008 | 0.480 | 0.001 | 0.115 | 0.028 | - | 0.043 |

Table S2. P-values for Red-and-green Macaw for rejecting the null hypothesis that loci are in linkage disequilibrium. Alpha adjusted for multiple comparisons is 0.001.

| | A19 | A21 | A32 | A42 | A90 | U21 | U32 | U41 | U43 | U55 |
|---|---|---|---|---|---|---|---|---|---|---|
| A19 | | | | | | | | | | |
| A21 | 0.399 | | | | | | | | | |
| A32 | 0.936 | 0.733 | | | | | | | | |
| A42 | 0.440 | 0.372 | 0.860 | | | | | | | |
| A90 | 1.000 | 0.553 | n/a | n/a | | | | | | |
| U21 | 0.999 | 0.925 | 0.170 | 0.621 | 0.996 | | | | | |
| U32 | 1.000 | 0.661 | 0.712 | 0.604 | 0.983 | 0.833 | | | | |
| U41 | 0.899 | 0.236 | 1.000 | 0.921 | 0.063 | 0.703 | 0.943 | | | |
| U43 | 0.406 | 0.139 | 0.490 | 0.230 | 0.595 | 0.996 | 0.631 | 0.575 | | |
| U55 | 0.650 | 0.984 | 1.000 | 0.820 | 0.835 | 0.890 | 0.522 | 0.914 | 0.673 | |
| U74 | 0.434 | 0.794 | 0.595 | 0.854 | 0.355 | 0.986 | 0.036 | 0.898 | 0.499 | 0.490 |

Table S3. P-values for Scarlet Macaw for rejecting the null hypothesis that loci are in linkage disequilibrium. Alpha adjusted for multiple comparisons is 0.001.

| | A17 | A19 | A21 | A32 | A42 | A90 | U21 | U32 | U41 | U43 |
|---|---|---|---|---|---|---|---|---|---|---|
| A17 | | | | | | | | | | |
| A19 | 0.557 | | | | | | | | | |
| A21 | 1.000 | 0.862 | | | | | | | | |
| A32 | 0.999 | 0.027 | 0.211 | | | | | | | |
| A42 | 0.573 | 0.058 | 0.809 | 0.881 | | | | | | |
| A90 | 0.989 | 0.032 | 1.000 | 0.457 | 1.000 | | | | | |
| U21 | 0.460 | 0.092 | 1.000 | 0.667 | 1.000 | 1.000 | | | | |
| U32 | 0.005 | 0.110 | 0.606 | 0.075 | 0.492 | 0.275 | 0.968 | | | |
| U41 | 0.078 | 0.105 | 0.360 | 0.031 | 0.267 | 0.643 | 0.988 | 0.501 | | |
| U43 | 0.049 | 0.201 | 0.421 | 0.467 | 0.474 | 0.571 | 0.031 | 0.649 | 0.994 | |
| U74 | <0.001 | 0.644 | 1.000 | 0.458 | 1.000 | 0.195 | 0.490 | 0.232 | 0.375 | 0.938 |

Table S4a. Sample size (N), observed (Ho) and expected (He) heterozygosity and allelic richness (A) for 12 microsatellite loci amplified in Red-and-green Macaw.

| | | A17 | A19 | A21 | A32 | A42 [a] | A90 | U21 | U32 | U41 | U43 | U55 | U74 | Average[b] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDD1 | N | 31 | 30 | 31 | 31 | 25 | 25 | 30 | 31 | 31 | 31 | 31 | 31 | 29.7 |
| | Ho | 0 | 0.87 | 0.68 | 0.03 | 0.88 | 0.64 | 0.87 | 0.74 | 0.16 | 0.55 | 0.03 | 0.58 | 0.55 |
| | He | 0 | 0.85 | 0.72 | 0.03 | 0.86 | 0.57 | 0.75 | 0.78 | 0.15 | 0.63 | 0.03 | 0.62 | 0.55 |
| | A | 1.0 | 6.2 | 4.1 | 1.2 | 6.9 | 3.6 | 3.9 | 5.4 | 1.7 | 3.2 | 1.2 | 4.5 | 3.8 |
| MDD2 | N | 18 | 17 | 18 | 18 | 13 | 10 | 16 | 18 | 18 | 18 | 18 | 18 | 16.6 |
| | Ho | 0 | 0.71 | 0.78 | 0 | 0.54 | 0.40 | 0.69 | 0.67 | 0.06 | 0.61 | 0.06 | 0.50 | 0.45 |
| | He | 0 | 0.81 | 0.77 | 0 | 0.85 | 0.54 | 0.74 | 0.77 | 0.06 | 0.59 | 0.06 | 0.62 | 0.53 |
| | A | 1.0 | 5.2 | 4.7 | 1.0 | 6.1 | 2.6 | 4.5 | 5.7 | 1.3 | 3.0 | 1.3 | 4.0 | 3.6 |
| MDD3 | N | 27 | 27 | 27 | 27 | 19 | 14 | 24 | 25 | 26 | 27 | 27 | 25 | 24.4 |
| | Ho | 0 | 0.74 | 0.81 | 0.04 | 0.68 | 0.36 | 0.67 | 0.84 | 0.19 | 0.56 | 0.26 | 0.52 | 0.52 |
| | He | 0 | 0.83 | 0.79 | 0.04 | 0.85 | 0.67 | 0.76 | 0.85 | 0.21 | 0.68 | 0.24 | 0.70 | 0.60 |
| | A | 1.0 | 6.1 | 5.1 | 1.2 | 6.5 | 3.7 | 4.8 | 6.5 | 2.1 | 3.6 | 2.4 | 4.2 | 4.2 |

[a] locus A42 for Red-and-green Macaw had many alleles that differed from others by only one base pair and was difficult to score, so was not included in subsequent analysis.

[b] average values do not include monomorphic locus A17.

Table S4b. Sample size (N), observed (Ho) and expected (He) heterozygosity and allelic richness (based on a minimum sample of 6) for 12 microsatellite loci amplified in Scarlet Macaw.

| | | A17[a] | A19 | A21 | A32 | A42[a] | A90 | U21 | U32[a] | U41 | U43 | U55 | U74 | Average[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDD1 | N | 34 | 34 | 34 | 34 | 29 | 30 | 34 | 34 | 34 | 34 | 34 | 34 | 33.2 |
| | Ho | 0.88 | 0.56 | 0.97 | 0.35 | 0.83 | 0.67 | 0.97 | 0.68 | 0.53 | 0.76 | - | 0.94 | 0.74 |
| | He | 0.85 | 0.62 | 0.90 | 0.36 | 0.90 | 0.85 | 0.91 | 0.70 | 0.55 | 0.76 | - | 0.88 | 0.75 |
| | A | 6.2 | 3.5 | 7.4 | 2.8 | 7.8 | 6.8 | 7.5 | 4.0 | 3.2 | 4.5 | - | 6.6 | 5.5 |
| MDD2 | N | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7.0 |
| | Ho | 0.86 | 0.86 | 0.57 | 0.71 | 0.86 | 0.86 | 1.00 | 0.43 | 0.43 | 1.00 | - | 1.00 | 0.78 |
| | He | 0.81 | 0.82 | 0.85 | 0.67 | 0.91 | 0.88 | 0.95 | 0.63 | 0.65 | 0.75 | - | 0.89 | 0.80 |
| | A | 5.6 | 4.8 | 5.7 | 4.7 | 6.8 | 5.9 | 8.4 | 3.0 | 3.0 | 4.0 | - | 7.3 | 5.2 |
| MDD3 | N | 7 | 7 | 7 | 7 | 3 | 3 | 7 | 7 | 6 | 7 | 7 | 7 | 6.2 |
| | Ho | 0.86 | 0.71 | 0.86 | 0.57 | 0.67 | 0.33 | 0.86 | 0.57 | 0.33 | 0.86 | - | 0.86 | 0.68 |
| | He | 0.86 | 0.75 | 0.92 | 0.56 | 0.80 | 0.60 | 0.90 | 0.71 | 0.32 | 0.79 | - | 0.82 | 0.73 |
| | A | 6.4 | 5.5 | 7.5 | 3.0 | * | * | 7.4 | 3.8 | 3.0 | 5.6 | - | 7.1 | 5.5 |
| Iquitos | N | 12 | 12 | 11 | 12 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 11.7 |
| | Ho | 0.67 | 0.75 | 0.82 | 0.58 | 0.73 | 0.91 | 0.92 | 0.75 | 0.67 | 0.58 | - | 0.75 | 0.74 |
| | He | 0.85 | 0.80 | 0.92 | 0.56 | 0.93 | 0.85 | 0.92 | 0.83 | 0.74 | 0.83 | - | 0.83 | 0.82 |
| | A | 7.2 | 5.0 | 7.8 | 4.5 | 8.1 | 6.2 | 8.0 | 5.5 | 4.2 | 5.3 | - | 6.5 | 6.2 |

[a] loci that significantly deviated from HWE after correcting for multiple comparisons.

* did not meet minimum sample size of 6.

Table S5. Log likelihood results from program Structure for the number of clusters (K) one through six for Red-and-green Macaw and Scarlet Macaw based on 10 and nine microsatellite loci, respectively.

| | Red-and-green Macaw | Scarlet Macaw |
|---|---|---|
| K | Structure Likelihoods (LnP(D)) | Structure Likelihoods (LnP(D)) |
| 1 | -1721.63 | -2050.32 |
| 2 | -1753.33 | -2077.94 |
| 3 | -1768.12 | -2180.03 |
| 4 | -1798.85 | -2271.63 |
| 5 | -1805.31 | -2323.19 |
| 6 | -1780.63 | -2244.61 |