Supplementary Table 1: Red pandas sampled in three zoos, their demographic and enclosures details.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Place | Red Panda  ID | Age | Age class/sex | Sociality | Breeding history | Enclosure  area (m2) | Enclosure type\* | Nest  No. | Individuals sampled for fGCM/fAM or fPM |
| Zoo 1 | RP1 | 4 | AF | Paired | No | 3068 | Open | 2 | Yes / Yes |
| Zoo 1 | RP2 | 6 | AF | Paired | No | 192 | Open | 3 | Yes / Yes |
| Zoo 1 | RP3 | 17 | AM | Paired | Yes | 192 | Open | 3 | Yes / Yes |
| Zoo 1 | RP4 | 3 | AM | Paired | Yes | 1560 | Open | 2 | Yes / Yes |
| Zoo 1 | RP5 | 5 | AF | Paired | Yes | 1560 | Open | 2 | Yes / Yes |
| Zoo 1 | RP6 | 5 | AM | Paired | Yes | 1560 | Open | 2 | Yes / Yes |
| Zoo 1 | RP7 | 8 | AF | Paired | Yes | 495 | Open | 3 | Yes / Yes |
| Zoo 1 | RP8 | 3 | AF | Paired | Yes | 2925 | Open | 3 | Yes / Yes |
| Zoo 1 | RP9 | 7 | AF | Female with one cub | Yes | 2925 | Open | 3 | Yes / Yes |
| Zoo 1 | RP10 | 0.6 | CF | Female with one cub | - | 2925 | Open | 3 | Yes / No |
| Zoo 1 | RP11 | 3 | AM | Solitary | No | 350 | Open | 1 | Yes / Yes |
| Zoo 1 | RP12 | 11 | AF | Female with two cubs | Yes | 322 | Open | 3 | Yes / Yes |
| Zoo 1 | RP13 | 0.8 | CF | Female with two cubs | - | 322 | Open | 3 | Yes / No |
| Zoo 1 | RP14 | 0.8 | CM | Female with two cubs | - | 322 | Open | 3 | Yes / No |
| Zoo 1 | RP15 | 8 | AF | Paired | No | 462 | Open | 2 | Yes / Yes |
| Zoo 1 | RP16 | 8 | AM | Paired | Yes | 462 | Open | 2 | Yes / Yes |
| Zoo 1 | RP17 | 3 | AM | Paired | Yes | 400 | Open | 3 | Yes / Yes |
| Zoo 2 | RP18 | 7 | AF | Female with two cubs | Yes | 2463 | Open | 1 | Yes / Yes |
| Zoo 3 | RP19 | 16 | AM | Paired | Yes | 224 | Closed | 4 | Yes / Yes |
| Zoo 3 | RP20 | 4 | AF | Paired | Yes | 224 | Closed | 4 | Yes / Yes |

\*Open – enclosures were only fenced with open top, closed – enclosures were netted from all sides.

Supplementary Table 2: Details of female’s breeding rate since age of maturity and their fGCM and fPM concentration during the study

|  |  |  |  |
| --- | --- | --- | --- |
| ID (Age) | Mean fGCM  concentration | Mean fPM  concentration | Breeding rate (a/b\*100)# |
| RP1 (4) | 47 | 573 | 0 |
| RP2 (6) | 62 | 69 | 0 |
| RP5 (5) | 32 | 262 | 25 |
| RP7 (8) | 41 | 310 | 42.9 |
| RP8 (3) | 17 | 362 | 100 |
| RP9 (7) | 27 | 554 | 33.3 |
| RP12 (11) | 27 | 756 | 33.3 |
| RP15 (8) | 53 | 1303 | 0 |
| RP20 (4) | 38 | 17986 | 75 |