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The sustainable pair specificity in duet structures of the red-crowned crane *Grus japonensis* promotes the vocal-based monitoring of nesting pairs through the years

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The vocal-based monitoring has proved its use in many bird species and is promising for the red-crowned crane *(Grus japonensis)*. This species counts in the wild hardly over 2,000 birds and is endangered in the IUCN Red List status. Loud duets of nesting pairs can be recorded properly from a distance of 800 m in nature and are potentially appropriate for the monitoring, however their use in conservation is prevented in the absence of knowledge if the duets are pair-specific and stable through the years. In 2003 - 2006, we recorded 343 duets from 8 captive and 2 wild pairs. All the duets represented the sequence of syllables, containing 1 - 2 male and 1 - 4 female calls per syllable. We subdivided the syllables into five types, by the number of the male and the female calls per syllable, and analyzed the occurrence of the different syllable types in the duets of the 10 pairs. The analysis showed the sustainable pair-specific use of particular syllable types through years. Besides, for 88 duets of good quality (5 - 10 duets per pair), the discriminant analysis standard procedure, based on 7 frequency and temporal parameters of male and female calls, showed 97.7 % correct assignment to pair, significantly higher the value expected by chance.

For five captive pairs, we examined also stability of duets structures throughout four years, 2003 - 2006. We took 4 - 20 duets per pair per year, 272 duets in total. For duet syllables, containing either 1 male and 2 female calls or 1 male and 3 female calls, we measured 8 temporal-frequency parameters. MANOVA showed that the effect of pair identity on the syllable parameters was always stronger than the effect of the year of recording. Discriminant analysis standard procedure showed high percentages of correct classification to pair, varying from 98.2 to 100 % between years. Cross-validation of duets from the test sets (represented by samples of 2004, 2005 and 2006) with discriminant functions derived from the training duet sets (represented respectively by pooled samples of 2003, 2003 - 2004, and 2003 - 2005) showed comparable high percentages of correct classification to pair, varying from 91.2 to 95.4 % between analyses. Our data suggest that red-crowned crane pairs can be reliable identified by their duets and that pair-specific differences in syllable parameters are stable between years.