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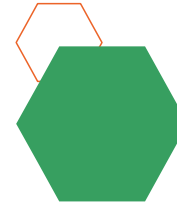
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ИНСТИТУТ ОХРАНЫ
ОКРУЖАЮЩЕЙ СРЕДЫ»

GENETIC PASSPORT SYSTEM FOR CAPTIVE FALCONS - SAKER, GYRFALCON AND PEREGRINE FALCON CONSERVATION PROSPECTS IN RUSSIA

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Basis for the falcon genetic passportization program in Russia

- In Russia, illegal capture for foreign sales is the main threat for saker and gyrfalcon populations (Kovács et al., 2014, Lobkov et al., 2020).
- Comprehensive active plan for creation of Reintroduction and conservation centres for falcons in the Kamchatka region and bustards in the Republic of Kalmykia signed into law by the Vice-Prime Minister V. Abramchenko in 2021:
 - Investigation of the order of marking falcons in captivity;
 - Investigation of the order of tracing falcons individually from hatching to selling and transferring abroad.
- DNA analysis is a “gold standard” for individual identification and parentage studies for humans and animals (Saks et al., 1991).



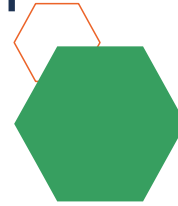
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Genetic passport investigation

- Nuclear microsatellites (STRs) are codominant, multi-allelic, hypervariable genetic markers which allow running analyses quickly and automatically and have already shown their possibilities in forensic DNA testing of falcons (Beasley et al., 2021).
- We tested two STR sets: eight multispecies loci proposed by Dawnay et al., 2007, and 10 saker-specific loci established by Hou et al, 2018, using a primary dataset contained of 99 samples (85 sakers, 12 gyrfalcons and two hybrids).
- Both STR sets showed high significance of individual genotyping for sakers and gyrfalcons, but 10 loci by Hou et al. also showed a possibility to establish a simple and cheap protocol for falcon routine genotyping.
- For now, this protocol has been tested using 662 samples of natural and captive sakers, gyrfalcons and peregrine falcons.



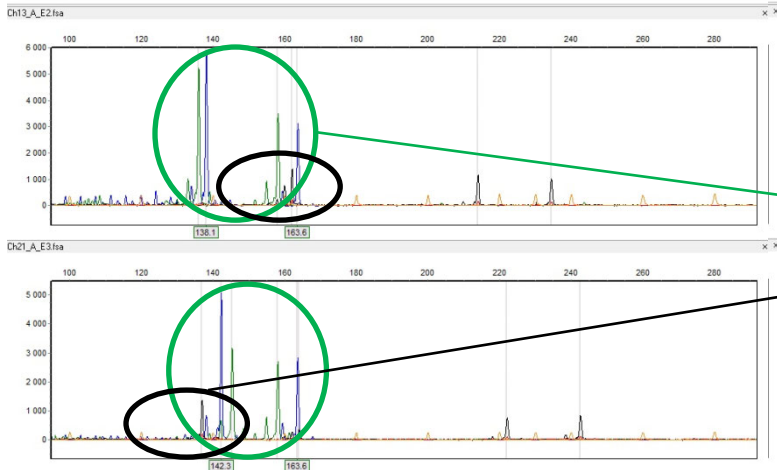
Genetic passport accuracy testing

- The suggested falcon genetic STR passport is similar to human forensic identification systems like CODIS (Budowle et al., 2016) and shows similar accuracy for falcon individual genotyping comparing to the species population numbers and number of possible siblings:

$$P_I \leq 10^{-9}$$
$$P_{Istbs} \leq 10^{-3}$$

**Total saker and gyrfalcon
population number
 $\leq 10^6$ (IUCN);
Number of siblings $\leq 10^2$**

**Capillary electrophoresis peak
profiles show differences
between samples**



Breeding stock genotyping for Russian falconries

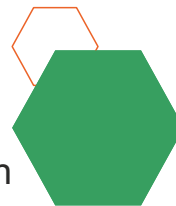
- Individual identification of about 380 captive birds by now;
- Paternity testing and genetic registry for falconries;
- Probability to check the breeding stock and breeding programs and exclude occasional mistakes in identification even for old cases;
- Unique genetic identifier for each bird and its offspring to show the legitimacy of rare species keeping.

Basic design of the new falcon pedigree certificate with QR-code record of the bird genotype



Prospects and implementation phases of the falcon genetic passport in Russia

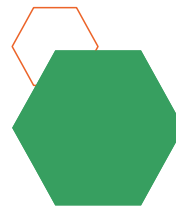
- Checking the test system accuracy for peregrines and hybrids with peregrines;
- Establishing the genetic registry for all Russian falconries;
- Falcon STR test system comparison testing for different laboratories;
- Establishing synthetic DNA standards and a ready-to-use kit for forensic DNA testing of sakers, gyrfalcons and peregrine falcons origin in forensic expert institutions in case when the rare species illegal outtake from nature is suspected.
- Some Russian manufacturers of forensic reagents and test systems are ready to take part in this program.



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Thank you for your attention!