

Genetic differentiation in sea bird colonies: a case study on the common tern (*Sterna hirundo*) and a literature review

Starting date: Flexible

Duration: 6 months

Genetic differentiation represents the degree to which two populations from the same species vary genetically. The assessment of genetic differentiation allows us to understand the links between populations, which is particularly important, for example, in conservation genetics, when one aims to pinpoint the conservation units in an endangered species. In birds, genetic differentiation is usually low, since birds are particularly mobile, but its level is expected to vary in relation to species characteristics, such as genetic variability, migratory capacity (gene flow) and habitat requirements (isolation). Genetic differentiation is usually measured using neutral and variable genetic markers, such as microsatellites. Therefore, the variability of the markers used also impacts upon the measured level of genetic differentiation. Over the last decade, a huge number of studies had investigated genetic variability and differentiation across bird species. Direct comparison of the genetic differentiation levels found in these studies is quite difficult, but a meta-analytical approach in which one takes into account the genetic markers used, as well as population and species characteristics, offers a solution to this problem.

We study common terns (*Sterna hirundo*) at a long-term study population located in the Banter See at Wilhelmshaven on the German North Sea coast. Since 1992, all locally hatched birds have been marked with a transponder shortly prior to fledging and a genetic sample has been collected. We use antennae at resting places and around nests to identify both breeding and non-breeding individuals. Combined with 3-times-weekly checks of nests to record reproductive parameters and to mark offspring, our methods enable the systematic and remote documentation of individual presence and reproductive performance at the colony. Once birds have established themselves as Banter See breeders, their re-sighting probability is almost 100% and their return rate is 90%, such that we can collect data over long individual life cycles.

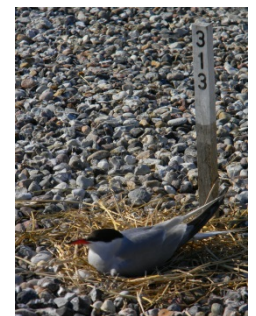
8981 birds hatched at the Banter See have been genetically characterized at 15 microsatellite loci. In addition, 98 birds hatched at other colonies have also been genotyped at these loci. Preliminary analyses have revealed that genetic differentiation is limited. In addition, there seem few differences in genetic variability (nor in fitness parameters) between chicks produced by resident parents, immigrant parents or “mixed” parents, which is also in agreement with the low genetic differentiation observed at the colony level.



Banter See colony



Ringed birds on our detection system



Numbered tern nest

In the proposed project, we would like to verify these findings and place them in a larger context by conducting a meta-analysis/review incorporating published studies of colony differentiation in other tern populations, as well as other (sea) bird species. An exhaustive search of the literature will allow to determinate the relevant criterions explaining the level of genetic differentiation in (sea) birds (e.g. migratory behaviour, phylogeny, genetic markers used, genetic variability). We therefore are searching for a motivated and autonomous student who is enthusiastic about reading scientific papers and statistical analysis. The student will work in an international team (using English as working language). Basic knowledge in population genetics would be useful, but is not required. Depending on the starting date, the student could be integrated (if interested) in the field work, which takes place every year from April to August. In this case, (s)he would participate in the monitoring of reproductive performance and assist with behavioural observations, according to his/her interests. No prior experience with birds or fieldwork is required.

For more information, please contact **Dr. Coraline Bichet** (coraline.bichet@ifv-vogelwarte.de) or **Dr. Sandra Bouwhuis** (sandra.bouwhuis@ifv-vogelwarte.de), Institute of Avian Research, Wilhelmshaven, Germany