



## MASTS – PECRE Final report: Dr Milaja Nykanen

**Host Institution:** Scottish Oceans Institute, Gatty Marine Laboratory, East Sands, St Andrews, KY16 8LB, Scotland, UK

**Hosting Faculty:** Prof. Oscar Gaggiotti, School of Biology

**Home Institution:** School of Biological, Earth and Environmental Sciences, University College Cork, Distillery Fields, North Mall, Cork, Ireland

### **Background**

The purpose of the exchange was to conduct laboratory work and prepare bottlenose dolphin (*Tursiops truncatus*) skin tissue samples for Next-Generation Sequencing, and to carry out the subsequent bioinformatic treatment of the sequenced genomic regions and statistical analyses leading to genotyping of 10,000 Single Nuclear Polymorphisms (SNPs). This new genetic data will ultimately help to avail the fine-scale population structure and quantify connectivity within the meta-population of coastal bottlenose dolphins ranging from the British Isles to French waters, once the statistical analyses are completed. PECRE provided Dr Nykanen the opportunity to undertake two separate research visits to St Andrews totalling up to eight weeks in duration, and learn new DNA extraction methods, as well as to gain experience in the bioinformatics treatment of the genomic data. Dr Nykanen contributed to the project by bringing tissue samples collected from wild dolphins in the coastal waters of Ireland, and conducting phylogenomic analyses on a different, already available data set, that will contribute to an upcoming publication in the near future.

### **Interaction with MASTS community**

During her visits to St Andrews, Dr Nykanen participated in the seminars organized by the Centre for Biological Diversity, and took part in the laboratory meetings of the Behaviour, genetics and speciation group. She participated in the Ecological Genomics journal club, as well as the meetings of the SMRU Early Career Group. She also gave a tutorial on building time-calibrated phylogenies using StarBEAST2 to Prof. Gaggiotti's research group.

### **Outputs expected and completed**

*Development of laboratory skills and statistical techniques and advancement of understanding of these techniques in a wider evolutionary context:*

During the first visit to St Andrews, high-quality DNA was successfully extracted from 96 bottlenose tissue samples using the phenol-chloroform technique, and sent for Next-

Generation sequencing using Double Digest Restriction Associated DNA (ddRAD) method. Achieving 10-15 samples per population will ensure that robust inferences can be made in the subsequent analyses of population structure and meta-population dynamics.

The second visit consisted of training in bioinformatic treatment of the raw genomic data returned from the sequencing facility, as well as training in working on a computer cluster. During this part of the visit, the DNA reads were first clipped and filtered for quality, and subsequently mapped to a bottlenose dolphin reference genome. We also started a *de novo* assembly method for the quality-filtered reads, in order to compare the results to the reference-based method, but due to the complexity of this technique, this analysis is still underway and will be continued from the home institution.

### **Future plans to building on the PECRE**

Dr Nykanen will continue collaborating with SOI in the future, and is preparing a time-calibrated phylogenetic analysis for a publication involving whole genomes of coastal and offshore bottlenose dolphins in the North Atlantic by Dr Marie Louis and Prof Gaggiotti. Dr Nykanen also hopes to expand on the research produced in this exchange to develop new phylogenomic methods using nuclear SNPs, and to continue networking with SOI and MASTS in future genomic projects.

### **Award Expenditure**

Travel (including flights and buses): £460

Accommodation: £750

Subsistence: £1080 (54 days at rate of £20/day)

Total: £2290