

Update on Lagenorhynchus – new findings and sample archive

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THE UNIVERSITY
of EDINBURGH



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ASCOBANS requests (AC25)

Lagenorhynchus species

23. Parties are requested to address the following research questions regarding the research and conservation of White-beaked Dolphins and Atlantic White-sided Dolphins and to report back to A26 (scheduled for 2021):

- a. Studies of life history parameters (ages and lengths at sexual maturity, reproductive rates, life spans) from stranded and bycaught animals;
- b. Better abundance estimates across all areas of the North Atlantic;
- c. Genetic sampling in northern and north-eastern parts of range;
- d. Studies of diet through stomach contents, stable isotope and fatty acid analyses;
- e. More contaminant studies;
- f. Studies of likely effects of climate change.

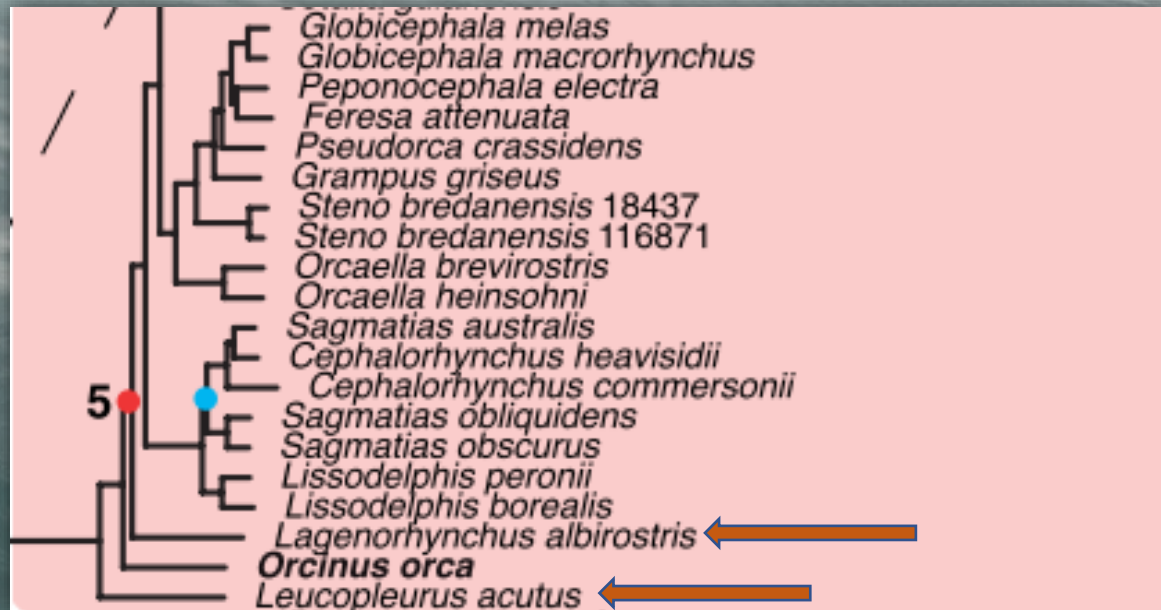
Lagenorhynchus species

17. Parties are encouraged to consider including White-beaked Dolphins and Atlantic White-sided Dolphins as priority species for strandings investigations. Analysis of the current samples archive is encouraged, in particular from networks at the margins of current distribution and for historical samples. Emphasis of value in collaboration/data sharing between strandings networks would enable a wider, ecosystem approach to any analysis.

Samples database

Sample type	France	Germany	NL	Belgium	Denmark	Scotland	Ireland	Engl. + Wales	Norway	Iceland	Faroes	Total
Gonads	14	6	12	10	0	67	0	34	0	0	0	143
Genetic analysis (-20 °C)	14	12	12	10	6	199	25	57	26	23	225	609
Stomach content (incl. microplastics)	0	0	0	0	0	25	0	12	0	0	0	37
Stomach content for diet	14	6	12	10	0	31	0	34	0	0	250	357
Teeth	14	15	12	10	0	66	0	34	0	0	200	351
Tissue frozen at -80 °C	0	7	0	10	0	12	0	20	0	0	0	49
Total	56	46	48	50	6	400	25	191	26	23	675	1546

Taxonomic revision



Proposed by Vollmer et al. (2019) "Taxonomic revision of the dolphin genus *Lagenorhynchus*"

Adopted and further supported by McGowen et al. (2020) "Phylogenomic Resolution of the Cetacean Tree of Life Using Target Sequence Capture"

- *Lagenorhynchus* does not form a monophyletic group
- New data suggests split into:
 - ***Lagenorhynchus***
 - *L. albirostris*
 - ***Leucopleurus***
 - *L. acutus*
 - *Sagmatias*
 - *S. australis*
 - *S. cruciger*
 - *S. obliquidens*
 - *S. obscurus*
- Yet to be officially accepted by SMM

Social structure of WBD

- Bertulli et al. (2021) describes fission-fusion dynamics as social structure
- Mainly short-term associations and fewer long-term associations
- Study in Iceland based on an 11-year photo-ID catalogue

INTEGRATIVE ZOOLOGY

ORIGINAL ARTICLE |  Full Access

Fission–fusion dynamics of a pelagic delphinid in the arctic: the white-beaked dolphin (*Lagenorhynchus albirostris*)

Chiara G. BERTULLI , Marianne H. RASMUSSEN, Massimiliano ROSSO 

First published: 09 February 2021 | <https://doi.org/10.1111/1749-4877.12524> | Citations: 1

 SECTIONS



PDF



TOOLS



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WBD and AWSD pathological findings

	Good	Moderate	Poor	Not evaluated	Total
Parasitic infection	0	0	4*	0	4
Gastritis	1	1	2	2	6
Parasitic infection and gastritis	1	5	7*	0	13
No pathological findings	0	2	2*	0	4
	2	8	15	2	27

*One AWSD included.

- The most common findings within 27 individuals were:
- Emaciation
- Gastritis; associated with nematode infection
- Pneumonia; associated with bacterial infection

Nutritional condition in relation to pathologic finding

Schick et al. (2020) "Pathological Findings in White-Beaked Dolphins (*Lagenorhynchus albirostris*) and Atlantic White-Sided Dolphins (*Lagenorhynchus acutus*) From the South-Eastern North Sea"

Genetic analysis of strandings

- Current n=322
 - AWSD=148
 - WBD=174
- Additional samples from the Netherlands (n=12) and England (n=57)

Species and samples type

- ◆ L. acutus
- ◆ Live sample
- ▲ Stranding
- ◆ L. albirostris
- ◆ Live sample
- ▲ Stranding

0 500 1,000 km

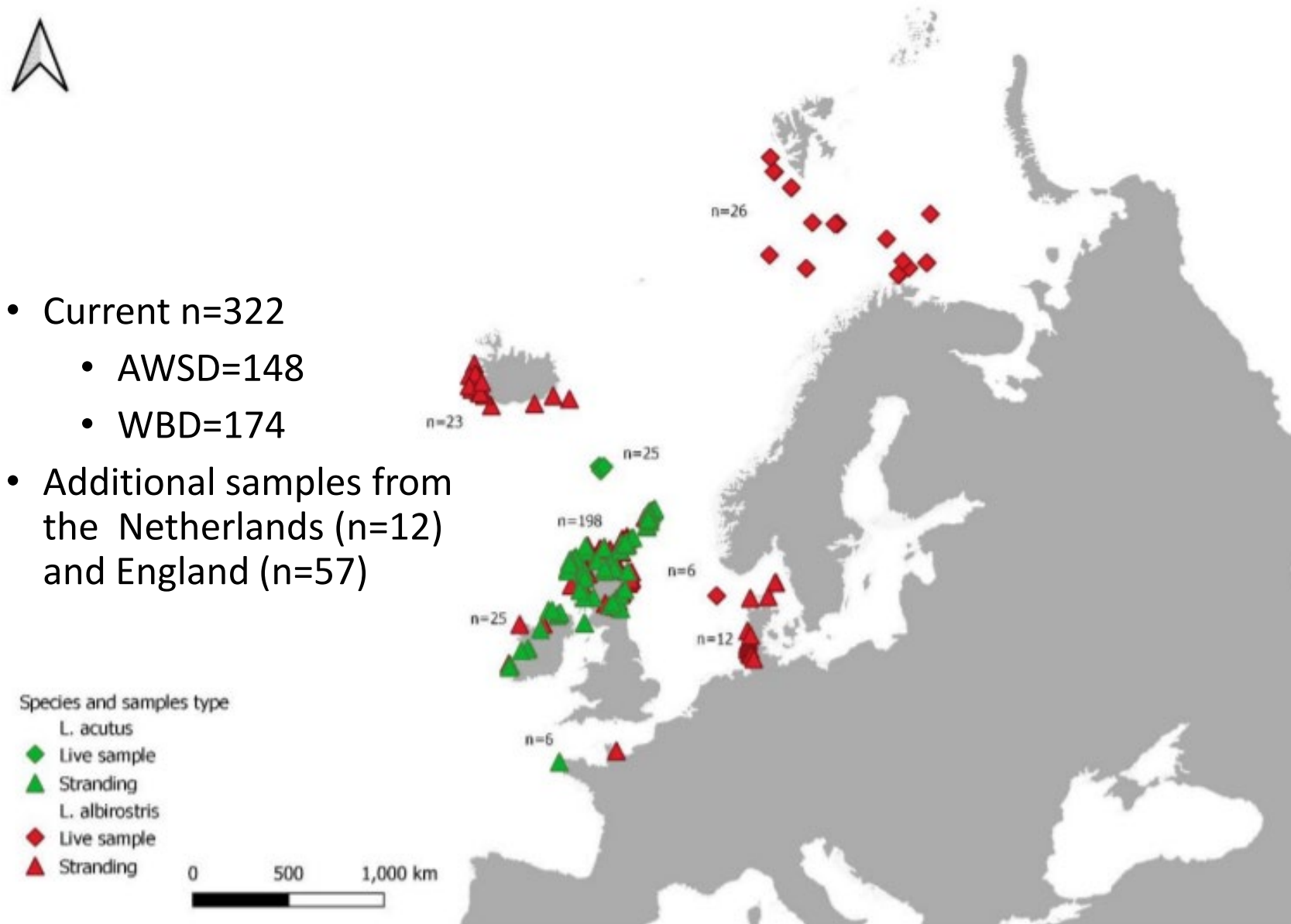
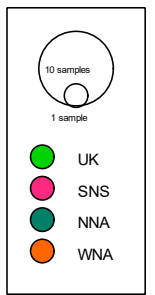
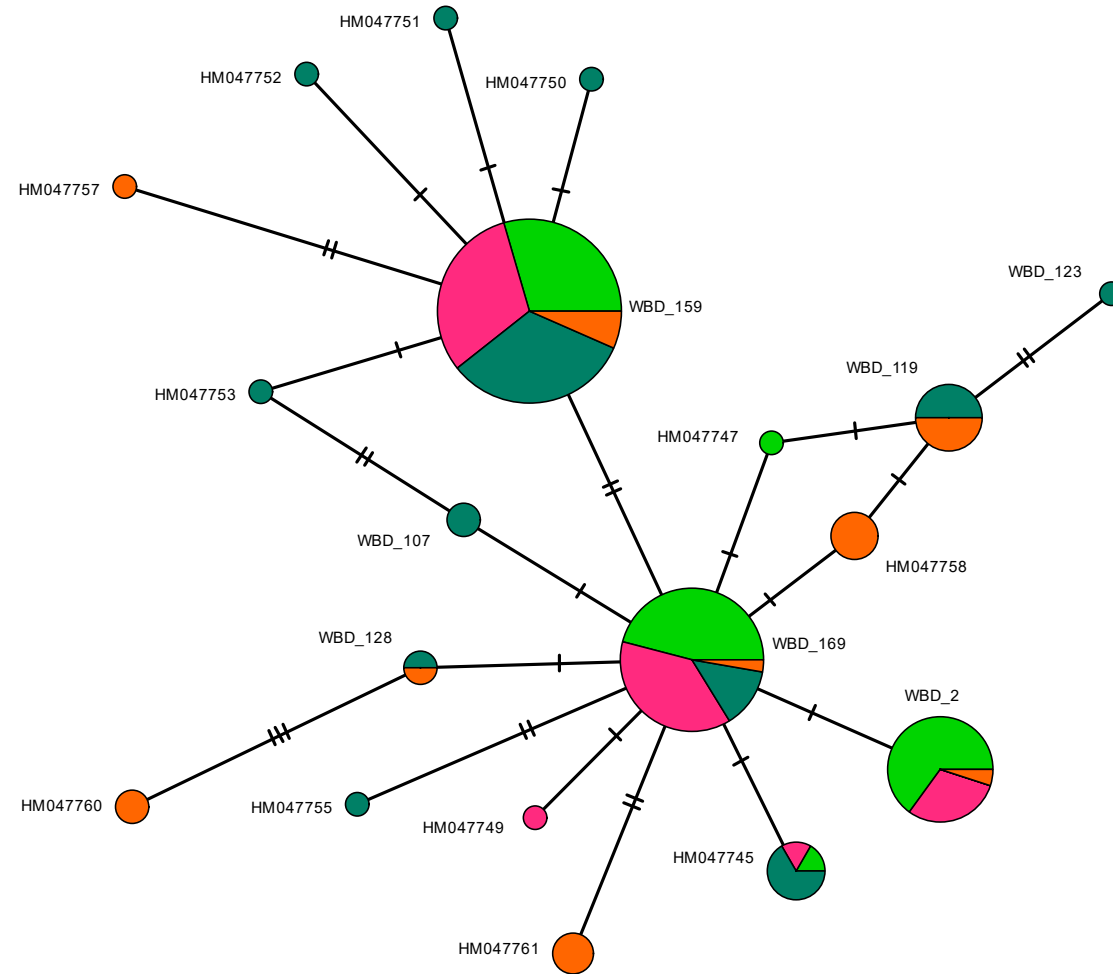


Figure 3: Map of Europe displaying location, number of samples per country, and sample type per country for AWSD and WBD.

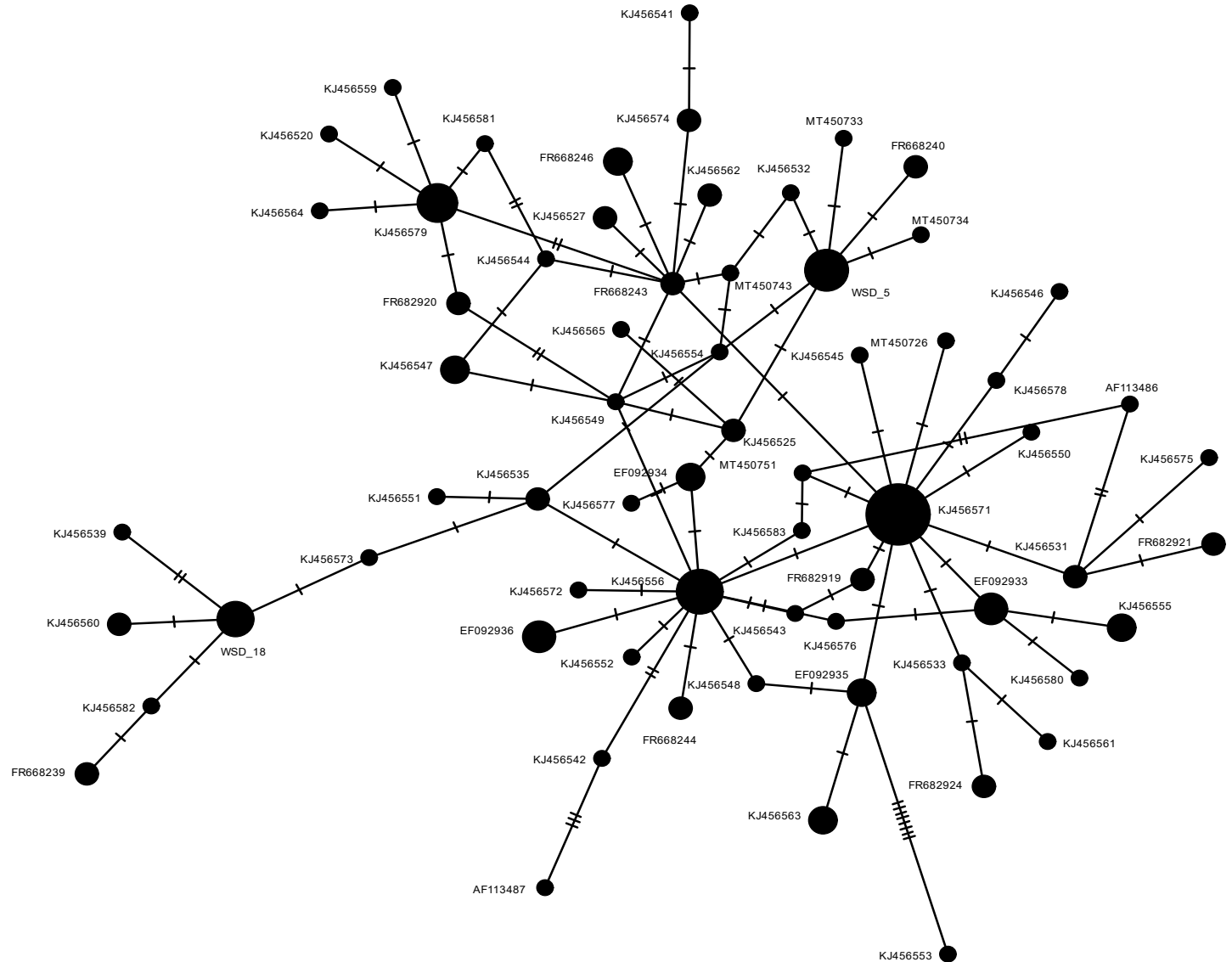
WBD genetic structure

- No apparent geographical structure based on mtDNA
- High haplotype diversity
- Analysis on fine-scale population structure underway



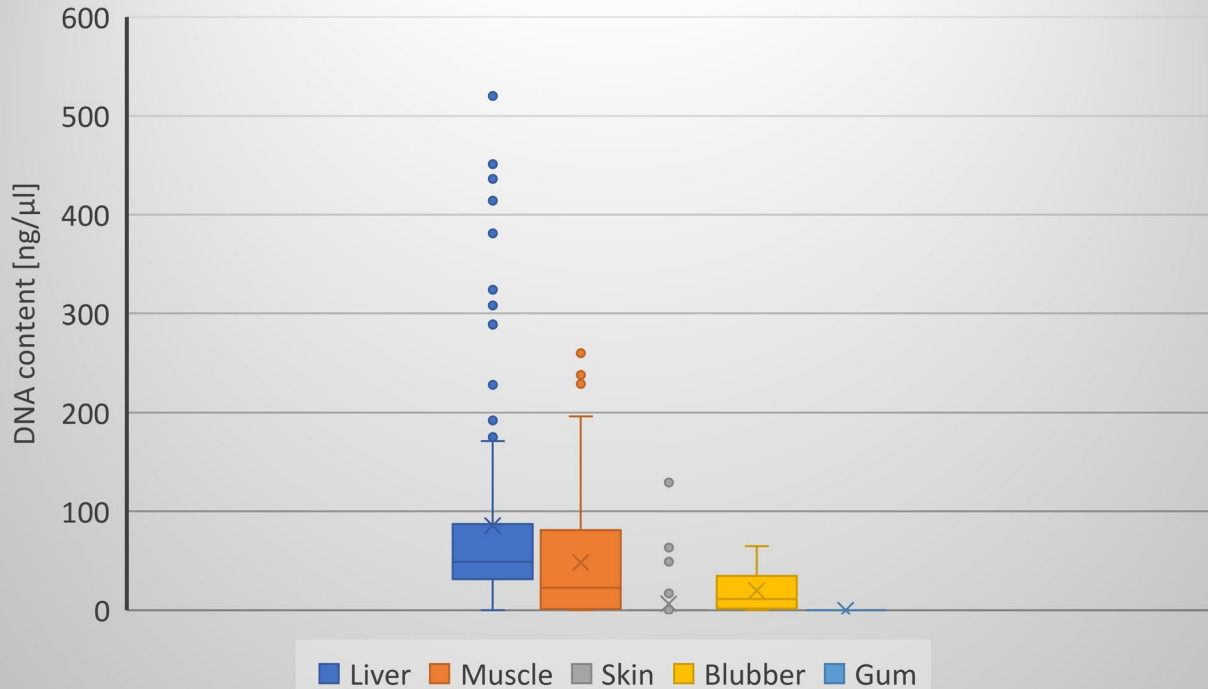
AWSD genetic structure

- No apparent structure based on mtDNA
- Very high haplotype diversity

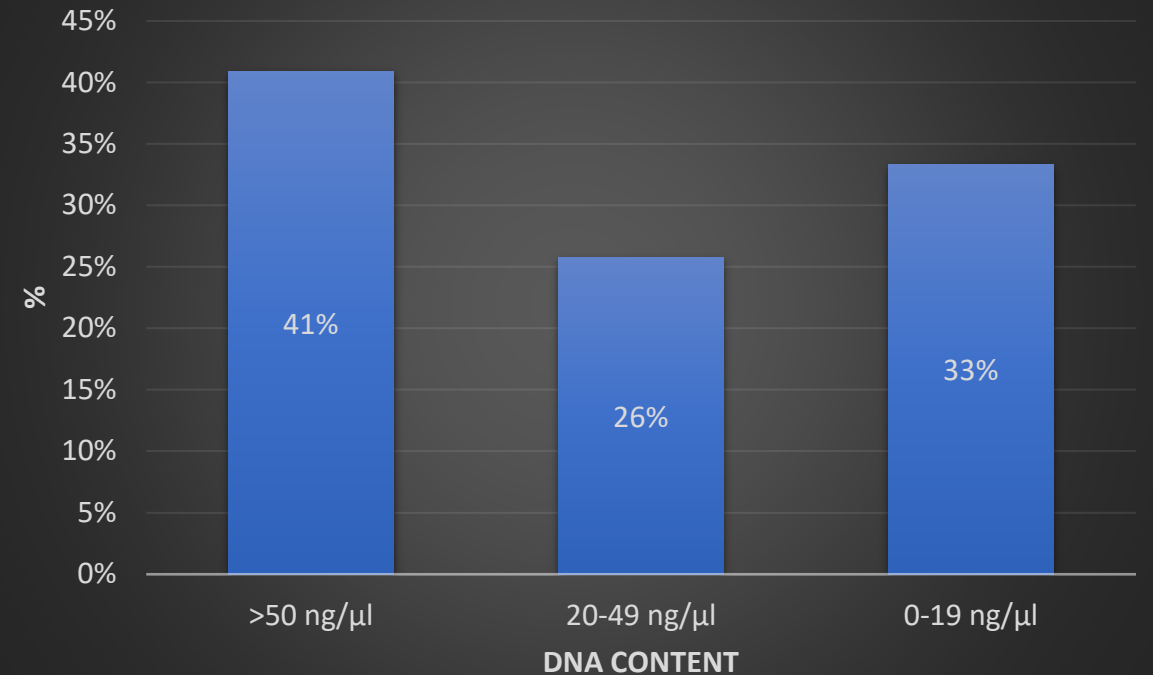


Sample quality

DNA content by tissue type



DNA concentrations



- Around a third of samples are unsuitable for analysis; reasons are multifaceted (Stored too warm, freezer failures, too decomposed, wrong storage, etc.)
- Agreed protocols for sample collection and storage could enhance sample quality and applicability

Next stages

- Fine-scale population structure underway
- Analysis on ~40.000 SNPs in 92 AWSO ongoing
- Promising dataset allows to continue with WBD
- Population structure could be combined with strandings metadata (pathological findings; GWAS)
- Whole-genome sequencing (WGS) would be helpful for a variety of genomic downstream analyses, but requires additional funding
 - Identification of genes under selection
 - Precise estimation of genome-wide heterozygosity (indicator of adaptive potential)
 - Estimating past demographic patterns; projection onto current threats

Conclusions

Collaboration and data sharing between stranding networks is valuable and should be carried on and facilitated.

Further emphasis on points mentioned during AC25:

Abundance estimates, contaminant studies, dietary analyses, and life history studies

Fine-scale population structure and genomic analysis underway but additional funding will be required in order to allow useful WGS analyses

Recommendations

Sample database is incomplete:

Could parties report back on updates on their sample database and ongoing research?

Assigning a data collator for both species could help resolve this before next update at AC27

Marc Gose offers to take this role if ASCOBANS agrees

Establishing sample collection and storage protocols would ensure more high-quality samples for future genetics and other 'omics research

Incorporate 'omics work in necropsy protocols with emphasis on facilitated -80° storage of suitable tissue types