New insights on the critically endangered population of bottlenose dolphins from Sado estuary (Portugal)

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Identifying threatened populations and quantifying their vulnerability is crucial for establishing priorities for conservation and providing robust information for decision-making. Small population size is a fundamental factor increasing the risk of extinction, owing to demographic and genetic stochasticity. When populations become too small, additional threats to stability and persistence arise, which can exacerbate the difficulty of stopping or reversing the decline. The bottlenose dolphin (*Tursiops truncatus*) population inhabiting the Sado estuary region (Portugal) is one of the smallest resident populations of this species in Europe. Dedicated research over the last four decades has revealed year-round long-term site fidelity to the estuary, very low levels of immigration, high calf/juvenile mortality, and an ageing, declining population. In this collaborative study, we update previous information on population dynamics and add important information about the genetic diversity (microsatellites, mtDNA, SNPs markers), inbreeding levels, population structure, and persistent organic pollutants (PCBs, DDTs, PBDEs, and HBCDs) loads. Presently, the Sado population has 25 individuals (10M; 8F; 7 Unknown sex), of which six individuals are more than 40 years old. We found lower genetic diversity, presence of unique maternal lineages, and high levels of relatedness (r>0.412). These animals are genetically differentiated from the other bottlenose dolphins sampled in the area (Iberian Peninsula, Azores and Madeira) suggesting an isolated population. For PCBs, five (62%) animals had concentrations higher than the highest threshold for PCB toxicology (>41mg/kg lipid weight, can cause immunosuppression and/or reproductive impairment) including one calf less than 6 months old. This, together with the fact that this population inhabits one of the most polluted estuaries in Portugal, characterized by multiple sources of contamination and increasing anthropogenic pressures (e.g. dredging, boat traffic, and dolphin-watching activities) highlights the critical situation of this resident bottlenose dolphin population and the urgency to implement stringent and effective conservation measures.