I. INTRODUCTION

1.1 Background

The sun bear (*Helarctos malayanus*) is an omnivorous carnivore. Sun bears are the smallest bear in the world (Wong *et al.*, 2002). The animal discovered in the forests of Bangladesh, Brunei, India, Indonesia (scattered in Sumatra & Kalimantan), Cambodia, Laos, Myanmar, Thailand, & Vietnam (Scotson *et al.*, 2017). Currently, the species threatened with extinction.

Sun bears classified as vulnerable by the IUCN - The World Conservation Union because their population estimated to have decline by 30-50% globally over the last 30 years (Scotson *et al.*, 2017). Sun bears listed as Appendix I on the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), which implies they prohibited from being trade internationally in whole or in parts (Maryanto *et al.*, 2020). Deforestation & illegal traffic in sun bear parts are the primary drivers of sun bear population reduction (Scotson *et al.*, 2017; Gomez *et al.*, 2019). Efforts to protect sun bears from ilegal trade can be made by providing biological information. One of them is molecular data with the COI gene (DNA Barcoding) which can be used for species identification.

Few molecular identification databases of sun bears are registered in the BOLD system. The BOLD system (Barcode of Life Data System) is an informatics platform that assists the acquisition, storage, analysis & publication of DNA barcoding records (Ratnasingham & Hebert, 2007). DNA barcoding is a method of species identification using DNA sequences from the species' mitochondria. DNA barcoding of the kingdom Animalia is based on one of the mitochondrial DNA genes, the Cytochrome Oxidase Subunit 1 (COI) gene (Tanabe & Toju, 2013). COI gene sequences have been widely used as DNA barcodes at the species level for various

animal groups (Kress *et al*., 2015). Because COI genes evolve faster, are conserved, maternally inherited, have no introns, few insertions, no deletion mutations, & no gene recombination (Hebert *et al*., 2003a; Hebert *et al*., 2003b; Susanti *et al*., 2018).

The complete mitochondrial genome of sun bears was reported by Lai *et al*. (2021) DNA barcodes for sun bear identification have been reported. Among others, Delisle & Strobeck (2005) designed barcodes and phylogenetics for 12 mitochondrial protein-coding genes in the suborder Caniformia. However, DNA barcode data of sun bears from Sumatra have not been registered in the BOLD system. Therefore, further DNA barcoding studies are needed to supplement the data & improve the accuracy of sun bear species identification.

1.2 Formulation of Research Problem

Based on the background that has been described, the problem formulated on how to characterize the DNA Barcode of the COI gene of the sun bear (*H. malayanus*)?

1.3 Research Objectives

This study aims to determine the DNA barcoding characteristics of sun bears based on the COI gene.

1.4 Research Benefits

DNA barcoding of sun bears will be a reference for forensic identification and for decision making by the government and conservation agencies.