TRAFFIC

HOW-TO GUIDE FOR **3D PRINTING SHARK SPECIES**

city 12

A QUICK OVERVIEW

THIS PROJECT AIMS TO ADDRESS THE UNSUSTAINABLE AND ILLEGAL DEMAND IN SHARK FINS BY EQUIPPING CUSTOMS OFFICIALS WITH THE EXPERTISE TO CORRECTLY IDENTIFY THE SHARK SPECIES BEING TRADED

> This guide provides some background and rationale to the 3D scanning and printing process undertaken to create replica shark fins. We have made all fin scans openly available

via traffic.org so that these revolutionary identification and training resources can be used where they are most needed.



FIGURE 1 Blue and Mako shark fins 3D laser scanned creating a digital representation of the real fins

STEP 1 3D LASER SCANNING THE REAL FINS

Dried shark fins (predominantly dorsal and pectoral but also a few caudal) from CITES listed sharks were collected over the years by Debra Abercrombie, a shark expert based in Florida, USA, and these fins were used by Deborah for training customs and fisheries officials across the world on the key identifying features of the fins of CITES listed shark species. The fins from this collection as well as Mako and Blue shark fins (dorsal and pectoral) sourced from the South African Department of Environment, Forestry and Fisheries were 3D laser scanned, which involved capturing multiple images of the fin using a line of laser light, followed by the use of 3D image software to reconstruct a digital representation of each fin.

STEP 2 Retapology

Once a digital representation of each fin was created, the 3D scanned images underwent a process known as retapology. This is a process whereby the 3D scanned image is modified to produce an optimally printed product. For our purposes, retapology allowed for the trailing edge of each fin to be thickened in the scan file as this section of a shark fin is very thin and without adjustment, the printed fin would have been too weak in that area. The adjustment in no way impacts on the identifying features of the fins. Retapology was also used to develop a full second set of scan files. The first set of scans allow for 3D printing of the fins with the only adjustment being the thickening of the trailing edge of each fin. For the second set

of scan files, each fin will print with the name, in English, of the shark and the type of fin (eg Oceanic Whitetip - dorsal) debossed along the leading edge of each fin as well as flat square section on which a QR code can be attached. The fins without names and QR codes are more suited to training on shark fin identification, while those with names and QR codes are designed to be used by front-line enforcement officials for fin identification. Should there be a need to use a different language to English for the fins with species names, the first set of scan files can be adjusted by a service provider skilled in retapologising to include the names in the desired language.



FIGURE 2

Retapologising the shark files to include shark names and raised section for adding QR codes



FIGURE 3

The replica shark fins after 3D printing using sintered nylon as the main material painting (Bowmouth Guitarfish caudal fin, Oceanic Whitetip dorsal fin, and Great Hammerhead pectoral fin)

STEP 4 Painting of the replica fins

The painting of the replica fins served as the most challenging step in the process. To ensure that the colours and markings on the painted fins most accurately matched those of the real fins, photographs were taken of the real fins with grey and colour reference cards. The final

painted fins involved multiple layers of spray painting to create the exact color for each fin, with specific paint marking added depending on the fin and key identifying features – for example, white mottled markings for oceanic whitetip sharks.



FIGURE 4

Replica shark fins after painting (Bowmouth Guitarfish caudal fin, Oceanic Whitetip dorsal fin, and Great Hammerhead pectoral fin)



STEP 5 QR CODES AND SPECIES ID PAGES

TRAFFIC developed QR codes which are linked to species ID pages for information on the key identification features of the specific fin and

contact details of shark experts which can be contacted for further confirmation of species.



TRAFFIC is a leading non-governmental organisation working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development.

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