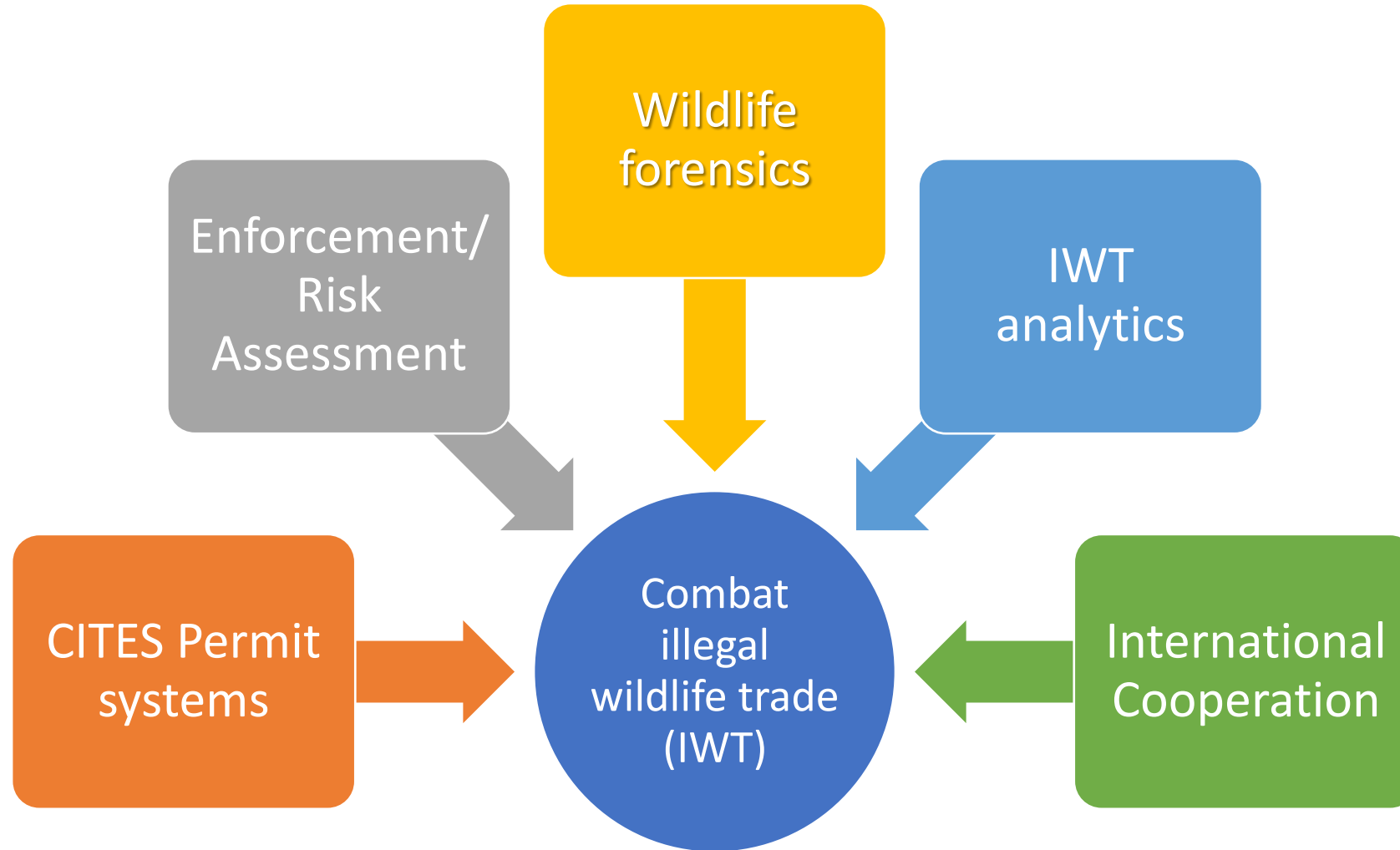




NParks' Efforts in using Wildlife Forensics to Combat Illegal Trade in Wildlife

Presenter: Dr Anna Wong (Director/Wildlife Trade & Centre for
Wildlife Rehabilitation)

Overview



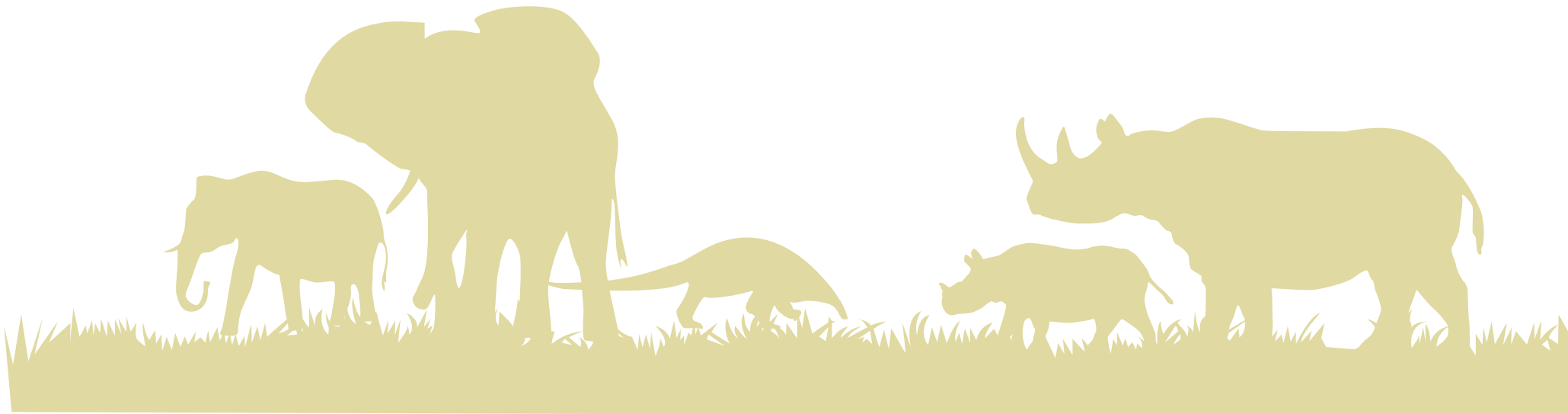
CWF

CENTRE FOR
WILDLIFE FORENSICS

Fauna
Identification and
Analysis

Flora
Identification and
Analysis

Molecular
Diagnostics
and Analysis



Recognise as CWF Reference Laboratory



Kiat How Tan's Post



Kiat How Tan
Senior Minister of State
GMO



Good news on the wildlife trade front! The Endangered Species (Import and Export) (Amendment) Bill was passed by Parliament today.

To ensure that the Act remains effective in tackling illegal wildlife trade, [Ministry of National Development Singapore \(MND\)](#) and [National Parks Board \(NParks\)](#) had embarked on a review of the Act and had consulted stakeholders and the community on the proposed amendments.

The amendments include stiffer penalties for illegal trade of protected species, enhanced enforcement powers, and greater clarity on the scope of Singapore's wildlife trade regulations. They aim to not only further deter illegal wildlife trade internationally and domestically, but also align the Act more closely with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Resolutions to better protect wildlife.

NParks' Centre for Wildlife Forensics was also recently recognised as a CITES Reference Laboratory last month! This means the Centre will be part of a public directory of wildlife forensic laboratories that other countries can draw on to conduct wildlife forensic analysis. It illustrates Singapore's capabilities in wildlife forensic science and will enhance our efforts in enforcement of CITES.

A big thank you to my colleagues at MND and NParks for their good work in bettering our position to fight illegal wildlife trade! You can learn more about our fight against illegal wildlife trade and amendments to the Act at <https://lnkd.in/dw-s3PJm>

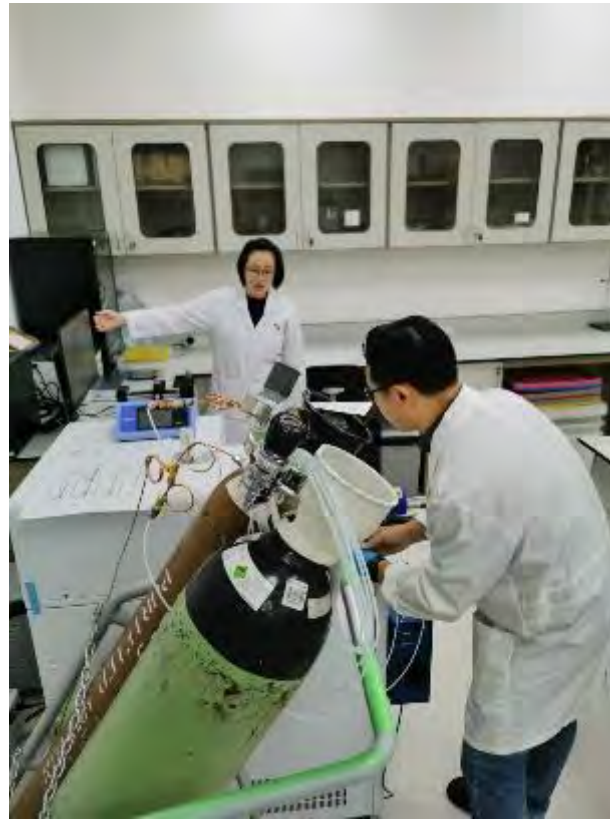


Enhancing our capabilities

- Launched in Aug 2020
- Draw upon expertise across NParks to build, deepen expertise in wildlife forensics
- Identify and analyse specimens involved in illegal wildlife trade
- Strengthen NParks' detection and diagnostic capabilities
- Panel of advisors to collaborate on seizure analysis and forensics work.
- ISO/IEC 17025:2017 certified
- Recognised as CITES registered laboratory (1st Asian country to be approved)



Involve in more than 40 wildlife investigation or enforcement cases



Journal publication in Nature Human Behavior in Feb 2022

nature human behaviour

[Explore content](#) [About the journal](#) [Publish with us](#) [Subscribe](#)

[nature](#) > [nature human behaviour](#) > [articles](#) > [article](#)

Article Published: 14 February 2022

Elephant genotypes reveal the size and connectivity of transnational ivory traffickers

[Samuel K. Wasser](#) , [Charles J. Welton](#), [Mary K. Kuhner](#), [Jubri F. Browari II](#), [Chris Morris](#), [Ryan J. Harwitz](#), [Anna Wong](#), [Charlene J. Fernandez](#), [Moses Y. Otende](#), [Yves Hoareau](#), [Zofia A. Kaliszewska](#), [Eunjin Jeon](#), [Kin-Lan Han](#) & [Bruce S. Weir](#)

Nature Human Behaviour 6, 371–382 (2022) [Cite this article](#)

1193 Accesses | 2 Citations | 2544 Altmetric [Metrics](#)

Access & Citations

1193

Article Accesses

1

[Web of Science](#)

2

[CrossRef](#)

Online attention



80 tweeters

3 blogs

2 Facebook pages

355 news outlets

1 Redditors

24 Mendeley

This article is in the 99th percentile (ranked 148th) of the 513,333 tracked articles of a similar age in all journals and the 99th percentile (ranked 1st) of the 81 tracked articles of a similar age in *Nature Human Behaviour*

Hosting over 15 visits, including media, national agencies and overseas delegates



Hosting more than 15 site visits, including media, national agencies and overseas delegates



Study visit by INTERPOL Wildlife Crime Working Group, November 2022

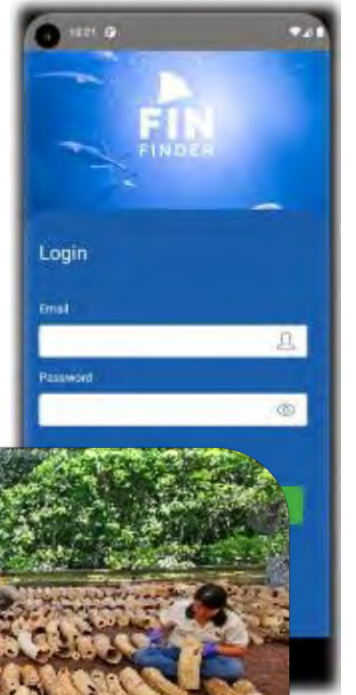


Visit by WOAH Sec-Gen, Jan 2023

Advanced investigation – *Centre for Wildlife Forensics*



Aims to become an international centre of excellence in wildlife forensic research and collaboration.



Technology streams

- DNA analysis (Identification and Geographic analysis of illegal trade and poaching)
- Vision-based/AI-assisted identification (Xylotron, FIN Finder)
- Spectrographic and Chemical Analysis (DART)



Fauna Identification and Analysis

- Focus on wildlife most severely impacted by illegal wildlife trade.
- Includes elephants, rhinoceros, pangolins, sharks & rays, songbirds, and saiga antelopes.
- Enhanced equipment and methodology to rapidly identify specimens



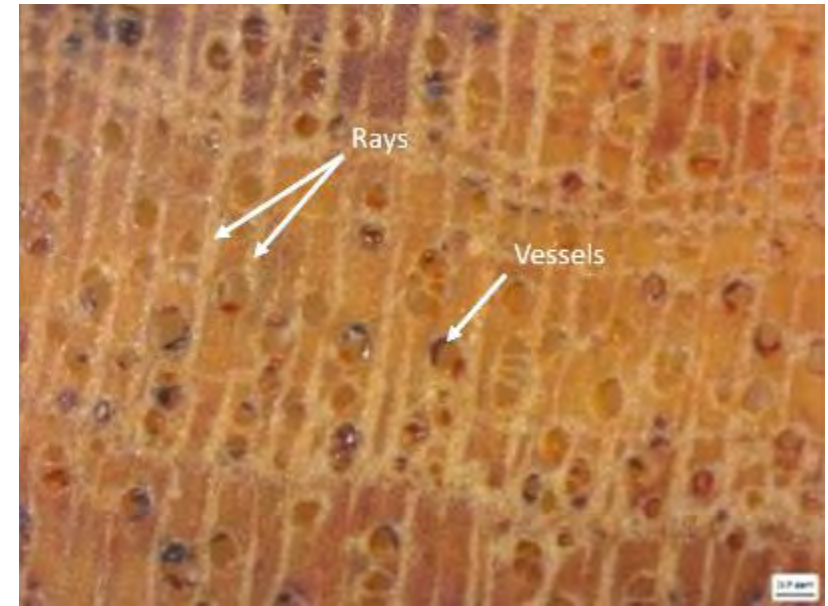
Flora identification and analysis

- Set up within the Singapore Botanic Gardens Seed Bank
- Singapore Xylarium: collection of authenticated timber specimens for reference
- Building up research database for timber identification, samples, cross sections, DNA
- Compare and identify specimens



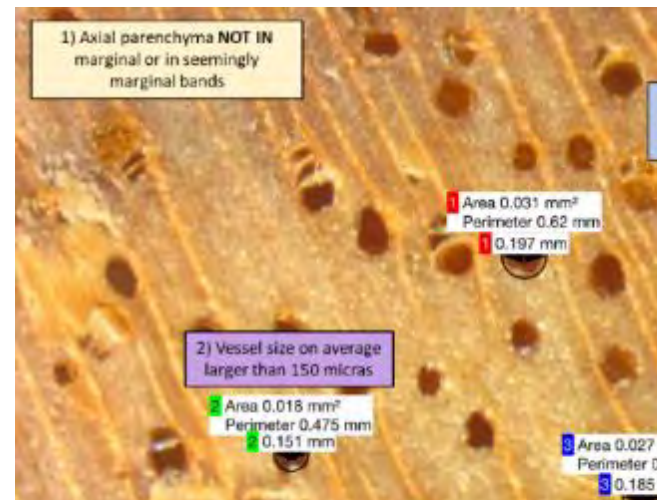
Flora identification and analysis

- Methods:
 - Wood morphology, genetics, chemical analysis e.g. DART-TOF MS
- Investigate and identify CITES timber
- Exchange information and protocols with international counterparts



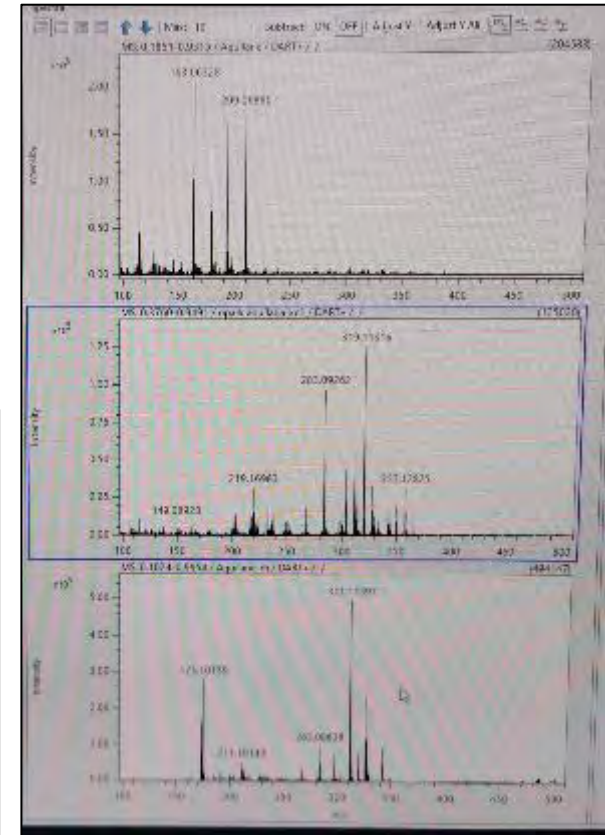
Vision-based/AI-assisted identification

- XyloTron is a field-deployable, reliable and quick tool to identify CITES-listed timber.
- Use of field imaging and identification of timber at the macroscopic scale through wood anatomy and its features.
- Artificial learning
- Speed up assessment of held shipments.



Spectrographic and Chemical Analysis

- Timber identification
- Direct analysis in real time (DART) mass spectrometry
- Determine chemical profile of piece of wood
- Complement current morphological identification and DNA analysis



Comparing agarwood dart profile (herbarium vs seized vs artificially processed samples)

Molecular Diagnostics Identification and Analysis

- Develop and validate molecular protocols using DNA barcoding technology to identify wildlife species e.g. elephant ivory, pangolin scales, sharks & rays, seahorses, sea cucumbers, rhinoceros, saiga, etc.
- Build and curate reference genetic libraries of various wildlife species with advanced molecular technologies
- Analysis of genomic data to establish familial matching, origin assignment, parentage testing, and population studies



DNA analysis of ivory seizures

nature
human behaviour

ARTICLES

<https://doi.org/10.1038/s41562-021-01267-6>

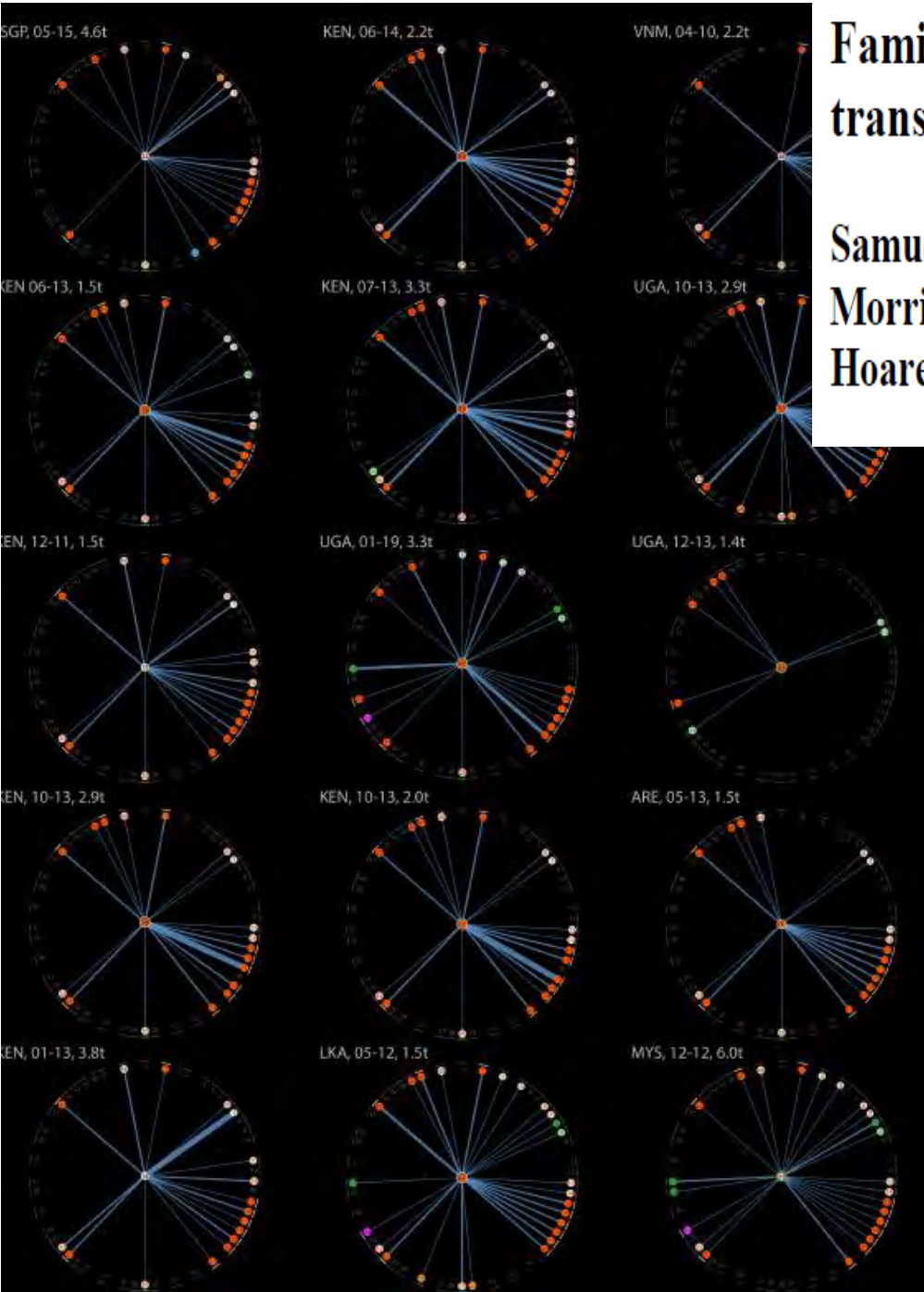
Check for updates

Elephant genotypes reveal the size and connectivity of transnational ivory traffickers

Samuel K. Wasser ¹✉, Charles J. Wolock ², Mary K. Kuhner¹, John E. Brown III³, Chris Morris ⁴, Ryan J. Horwitz ⁵, Anna Wong⁶, Charlene J. Fernandez⁶, Moses Y. Otiende⁷, Yves Hoareau ¹, Zofia A. Kaliszewska ¹, Eunjin Jeon ¹, Kin-Lan Han ¹ and Bruce S. Weir ²

- Collaboration with Dr Sam Wasser, University of Washington
- Published in Nature Human Behaviour
- Analyse ivory seizures globally including SG's seizures
- Reveal wildlife crime networks
- Importance of international cooperation



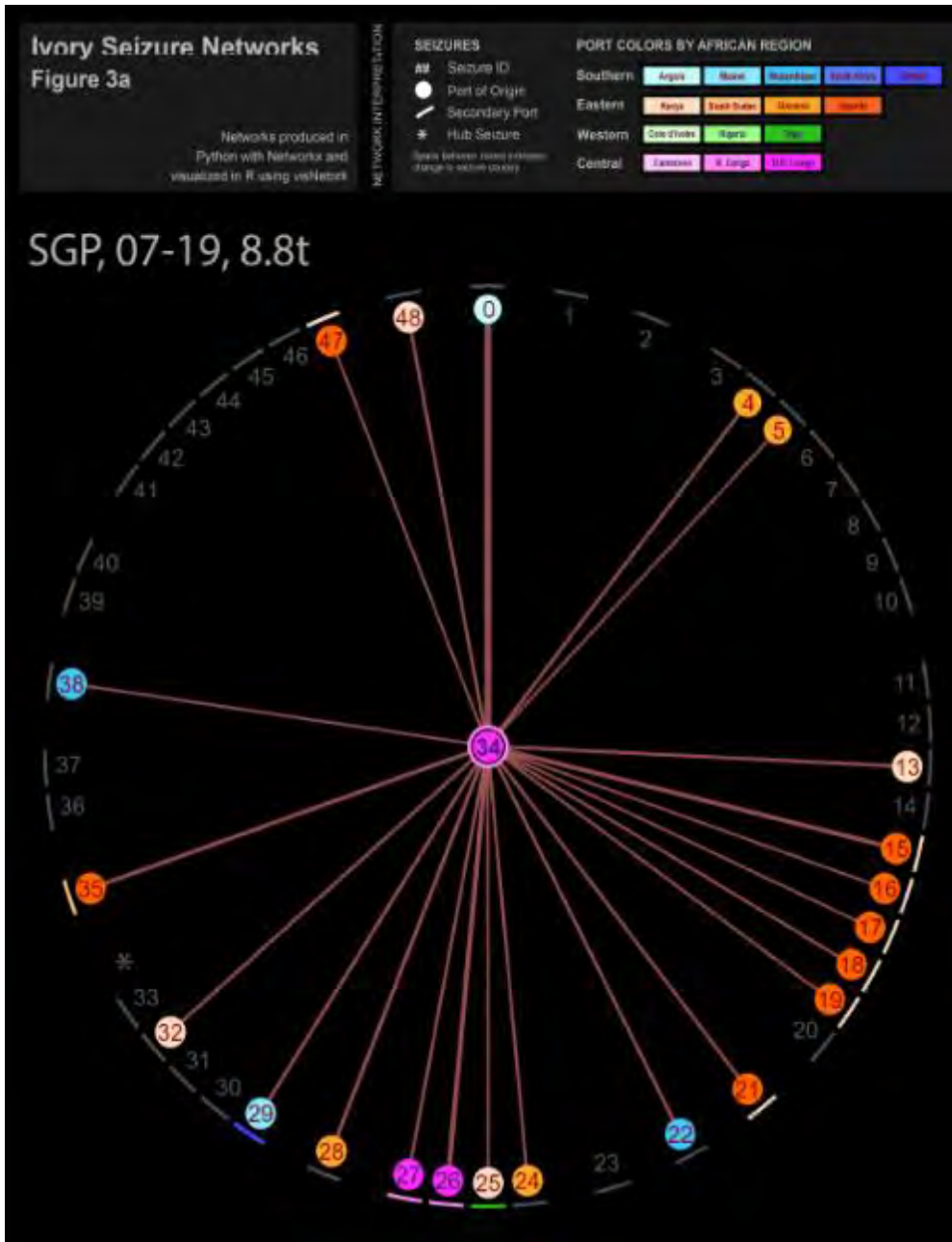


Familial matching of tusks delineates the size and connectivity of transnational criminal organizations

Samuel K Wasser^{1*}, Charles J. Wolock², Mary K. Kuhner¹, John E. Brown III³, Chris Morris⁴, Ryan J. Horwitz⁵, Anna Wong⁶, Charlene J. Fernandez⁶, Moses Y. Otiende⁷, Yves Hoareau¹, Zofia Kaliszewska¹, Kin-Lan Han¹, Bruce S. Weir²

- Done for 49 ivory seizures globally
- Links were established for each seizure
- Showed that East Africa countries (Uganda) main port of origin for export
- Democratic Republic of Congo is an emerging port for export



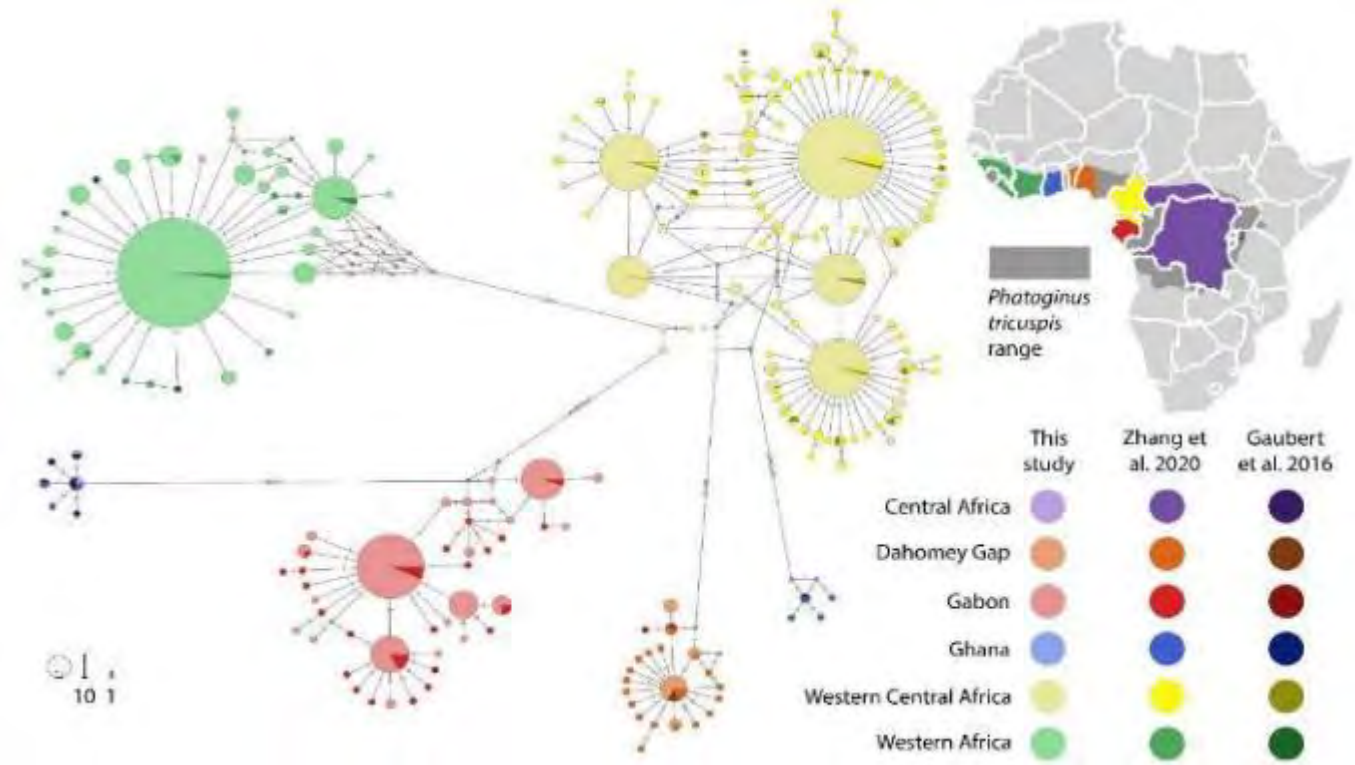


Case example - Singapore seizure in July 2019

- Has tusks that are genetically related to seizures from various port of origins
- Strongest link to seizure #0 (Angola), #26 (DRC) and #29 (Angola)
- Tusks could come from a herd from the KAZA region
- Could be linked to a common syndicate collecting tusks from poachers
- Focus enforcement on hotspot
- Convict syndicate for larger crime

Research collaboration on mapping pangolin trafficking

- Analysis of DNA extracted from seized pangolin scales
- Determine genetic composition and relatedness of individuals
- May shed light on possible origins of these scales
- Reveals insights on dynamics and networks of organised pangolin poaching and trafficking



Detection at Singapore Changi Airport

- Detected by airport security and NParks K9 unit on 4 October 2022
- 20 pieces of rhino horns weighing 34kg
- Estimate value of S\$1.2 million
- A South African national arrested
- South Africa – Singapore - Laos

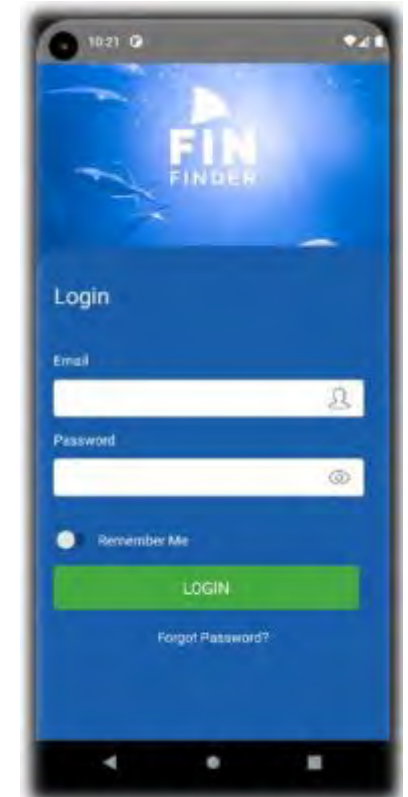
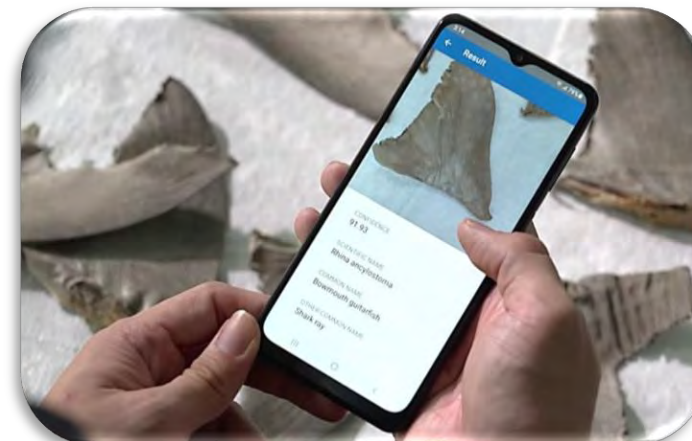


Seizure and local investigation

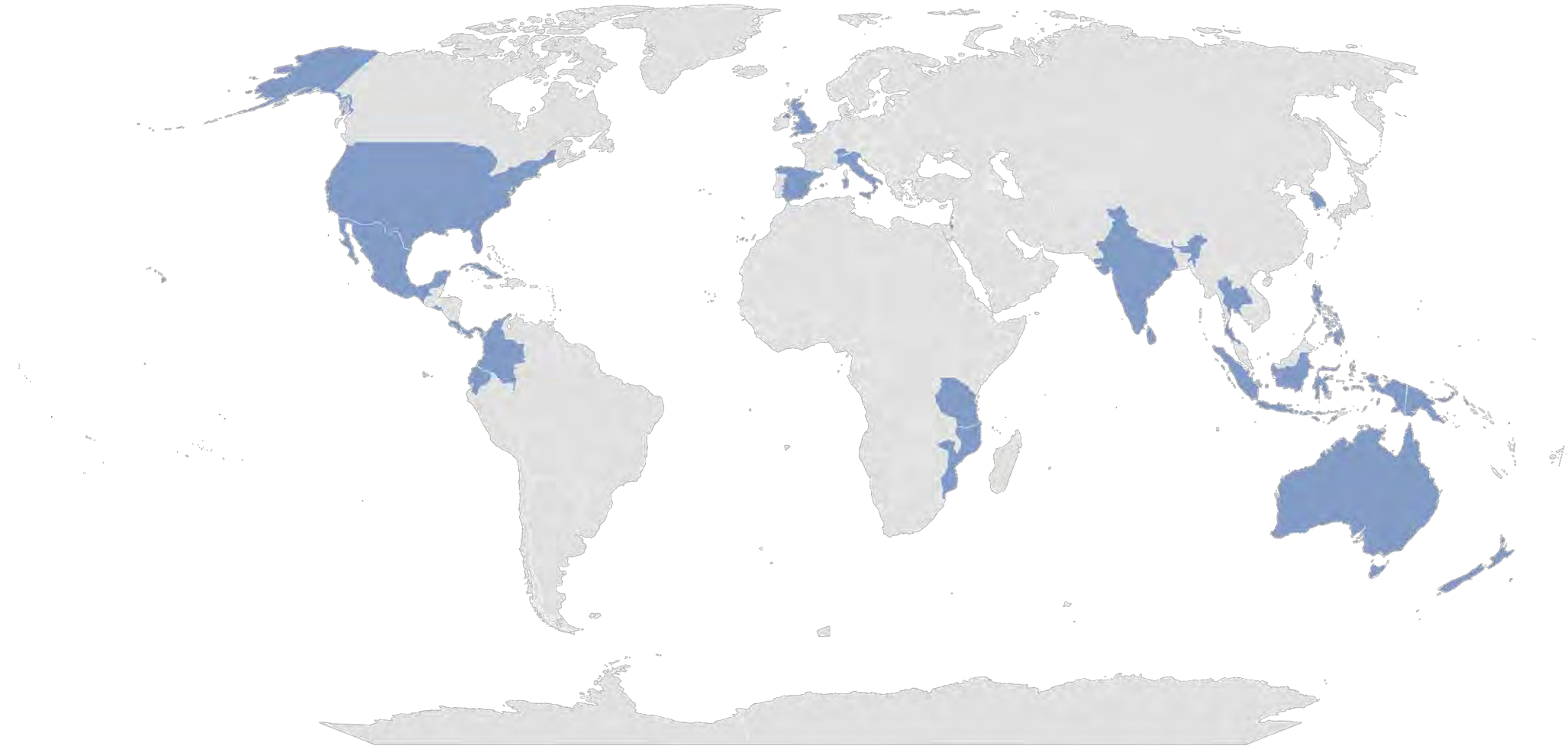
- The case is investigated by NParks under the Endangered Species (Import and Export) Act 2006 (“ESA”).
- Given that the rhino horns constitute proceeds of crime, Singapore Police Force also commenced money laundering investigation under the Corruption, Drug Trafficking and Other Serious Crimes (Confiscation of Benefits) Act 1992 (“CDSA”).
- Fingerprinting and DNA investigation
- Electronic devices (computers and phones)
- Financial screening on bank accounts and adverse reporting

Vision-based/AI-powered identification

- Fin Finder is Asia's first mobile application that employs **artificial intelligence (AI)** to visually identify illegally traded shark and ray species, up to 89.4% accuracy.
- Empower officers to quickly identify shark species and **flag suspicious fin shipments** for further DNA testing to stop the illegal trade of shark and ray fins.



Fin Finder Global Reach (Jun – Dec 2022)



THANK YOU

Acknowledging



World Organisation
for Animal Health
Founded as OIE